

LEVERAGE

User Guide

LEVERAGE 1.0.0 – November 2023

*LEVERAGE is a custom add-in for Obsidian developed to support the management of complexity in Artistic Gymnastics and released freely by **Patron Stefano - Uninettuno International Telematic University, Faculty of Engineering, Rome, Italy.***

LEVERAGE mainly relies on the 2022-2024 Code of Points of Men's Artistic Gymnastics, approved by the International Gymnastics Federation.

If you use LEVERAGE, please give credit to this work citing the sport engineering article about LEVERAGE development and concept idea:
Patron S., Falegnami A., Tomassi A., Romano E., “LEVERAGE: The Artistic Gymnastics Integrated Tool” - Uninettuno International Telematic University, Faculty of Engineering, Rome, Italy.

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Summary

The development of a management software aimed to Artistic Gymnastics rises from the need to organize and manage the complex rules and dynamics of this sport in a simple and effective way. The goal is to offer coaches and sector managers a tool to support their activity, in order to improve the technical planning of the athletes developing the potentiality of sports analytics.

The program was developed as a custom add-in for Obsidian, a software for the creation and the organization of Markdown files, whose potential can be expanded by installing official plugins or those ones developed by third parts. The implementation of the project in Obsidian allows to create connections and assign specific properties to data, simultaneously developing a mathematical graph structure, in order to reduce the complexity of the available data through a more efficient management of information.

The usage of related database query conceptually results in a DBMS directed to the information system of Gymnastics, consisting of athletes, teams, competitions and results, and also of the relationships between them. In this way, the developed tool allows to examine several athletes belonging to different teams and categories at the same time, evaluating their technical characteristics and results achieved during competitions, in order to control and improve the technical planning of competitions.

Through this logical data organization, the user has the possibility to create new entities and establish new relations, changing properties and orders in a custom way. Simultaneously, every change made is automatically updated by the system also in the specific data-saving section.

Moreover, in order to further simplify the data-entry activity and the sharing of information outside Obsidian, the application provides the importation and the exportation of data through CSV files.

At the moment the software supports the men's sector of Artistic Gymnastics, whose complete regulation of the discipline is illustrated in the latest version of the Code of Points "2022-2024 Code of Points of Men's Artistic Gymnastics", approved by the International Gymnastics Federation.

This document has been completely included into the system, adapting rules and contents in accordance with the software architecture. In particular, all data related to each gymnastics element has been collected and hierarchically organized into a graph structure, which can be directly displayed through its own plugin. In this way, all the elements belonging to the Code of Points have been clustered by associating their apparatus and their element group.

The user can also interactively consult the Code of Points through a specific database that offers multiple possibilities of searching and sorting, using the properties of each gymnastics element:

- Element
- Originator's Name
- Image
- Symbol
- Code Identification Number
- Apparatus
- Element Group (EG)
- Difficulty Value (DV)

In this advisory section, the symbols related to some gymnastics elements have been corrected in accordance with the legislation included in the Symbology Document "Element Symbols for Men's Artistic Gymnastics". However other elements, still valid and accepted by the international regulation but not reported in the Tables of Elements, have been completely designed from scratch following the style adopted by the Code of Points. These particular elements are illustrated in the PDF file "Table of Additional Elements", especially created and included in the PDF folder of the software.

The software has got also a database of the routines presented by athletes during the competitions, in order to offer the user an additional support tool for the construction of exercises and combinations between the elements trained by their athletes. In this database, in particular, the column of each element is directly connected to the database of the Code of Points. In this way, the user can dynamically use the predisposed filters to reduce the field of selectable elements, in order to considerably speed the construction of exercises.

Finally, the software provides some plugins that increase and improve the functionalities of the application. In particular, a special plugin for gymnastics was developed to support the construction of exercises, in order to check and automatically calculate the difficulty of the exercises included in the system. Through this plugin, an algorithm has been implemented to check the correct composition of the exercise and the combinations of elements analyzed, in accordance with the rules established by the Code of Points, then reporting to the user potential errors made during the construction of the exercise. At the end of the checking, if no errors have been reported, the algorithm calculates the difficulty score (D Score) of the exercise and possible connection values (CV), displaying them on the interface and directly including them into the file of the exercise analyzed.

Further developments of the software are directed towards the optimization of the user experience and the implementation of new functionalities, mainly aimed at the support of more data and statistics from sports analytics. The improvement of the potentiality of the software makes possible its diffusion also in other sport situations, in order to improve the performance of the athletes through a more focused technical and strategic scheduling.

The versatility of the software finally adds a considerable applicability also in many other management branches, where the efficient logical data organization is essential to optimize resources reducing wastes.

1 Introduction

This software is a custom add-in for Obsidian, designed to support gymnastics coaches and sector managers in their activity.

The application rises from the need to organize and manage the innumerable rules and dynamics existing in Artistic Gymnastics in a simple and effective way. The goal is to introduce and develop the concept of sports analytics also in this discipline, improving the technical planning of the athletes scheduled by their coaches.

The software architecture is designed with the aim to better organize the information system of Men's Artistic Gymnastics (MAG), consisting of athletes, teams, competitions and results, and also of the relationships between them. From a conceptual point of view, similarly to the activity developed by a DBMS, data-entry is managed through database query, whose interface allows the user to manipulate and customize data.

This tool also offers the possibility to examine several athletes belonging to different teams and categories at the same time, evaluating their technical characteristics and results achieved during competitions, in order to control and improve the technical planning of gymnasts. This is possible through user-management databases, whose files include properties that permit to create connections between them.

Moreover, the application provides an advisory section related to all rules and contents included in the latest version of the Code of Points "2022-2024 Code of Points of Men's Artistic Gymnastics", approved by the Fédération Internationale de Gymnastique (FIG). In particular, all gymnastics elements and also their features are searchable and sortable through a specific database.

The coaches can also manage the routine performed by the athletes during competitions, thanks to an additional database for the construction of exercises and combinations between the elements trained by gymnasts.

Finally, the software provides some plugins that increase and improve the functionalities of the application. In particular, a special plugin for gymnastics was developed to support the construction of exercises, in order to check and automatically calculate the difficulty of the exercises included in the system, in accordance with the rules established by the Code of Points.

2 Installation/Uninstallation

The application was developed as a custom add-in for Obsidian, a software for the creation and the organization of Markdown files, whose potential can be expanded by installing official plugins or those ones developed by third parts.

2.1 Installation

Installing Obsidian is necessary to run this management application for gymnastics.

Obsidian is available for free on the Obsidian official website: official download for Windows, MacOS and Linux at <https://obsidian.md/download>.

2.2 Uninstallation

Obsidian can be easily uninstalled through the standard uninstallation procedure from the Control Panel of the computer.

3 Usage

To start using this software is necessary to open Obsidian. Once run Obsidian, click on “Open folder as vault” (Figure 3.1) and choose the folder “LEVERAGE”.

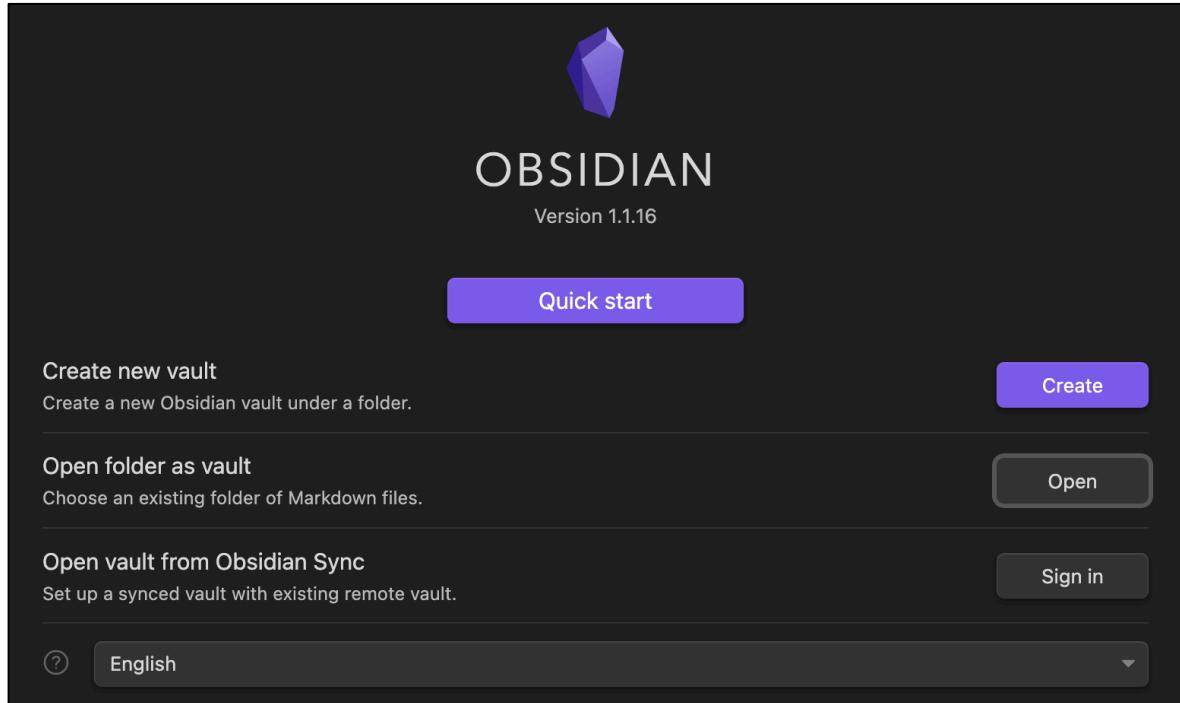


Figure 3.1: Obsidian Startup

After opening the folder, the user will receive a confirmation message to trust the author of the vault chose. Click on “Trust author and enable plugins” (Figure 3.2) and check the “Restricted mode” is off (Figure 3.3) to run the application.

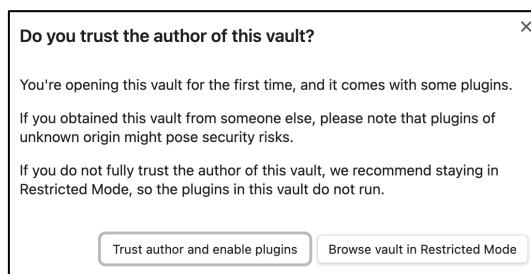


Figure 3.2: “Trust author and enable plugins” notice

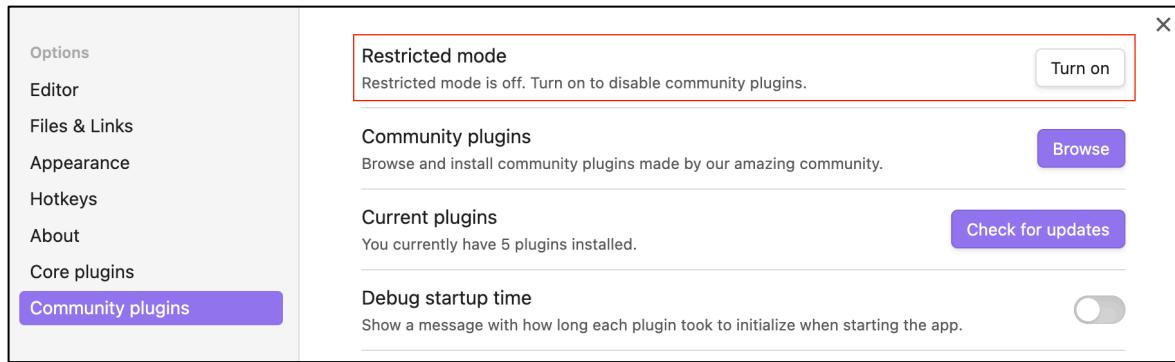


Figure 3.3: Restricted mode settings

3.1 User Interface (UI)

The User Interface (UI) of the software (Figure 3.4) is composed of 4 parts:

1. File Tab: space where the user can see the file selected from the Sidebar.
2. Sidebar: space for folders and files saved in the Vault of the software. It shows which file is displayed in the File Tab and its position.
3. Ribbon: space for the common commands of plugins. It is part of the left Sidebar that is always visible, even when the left Sidebar is closed.
4. Settings: software and plugins settings.

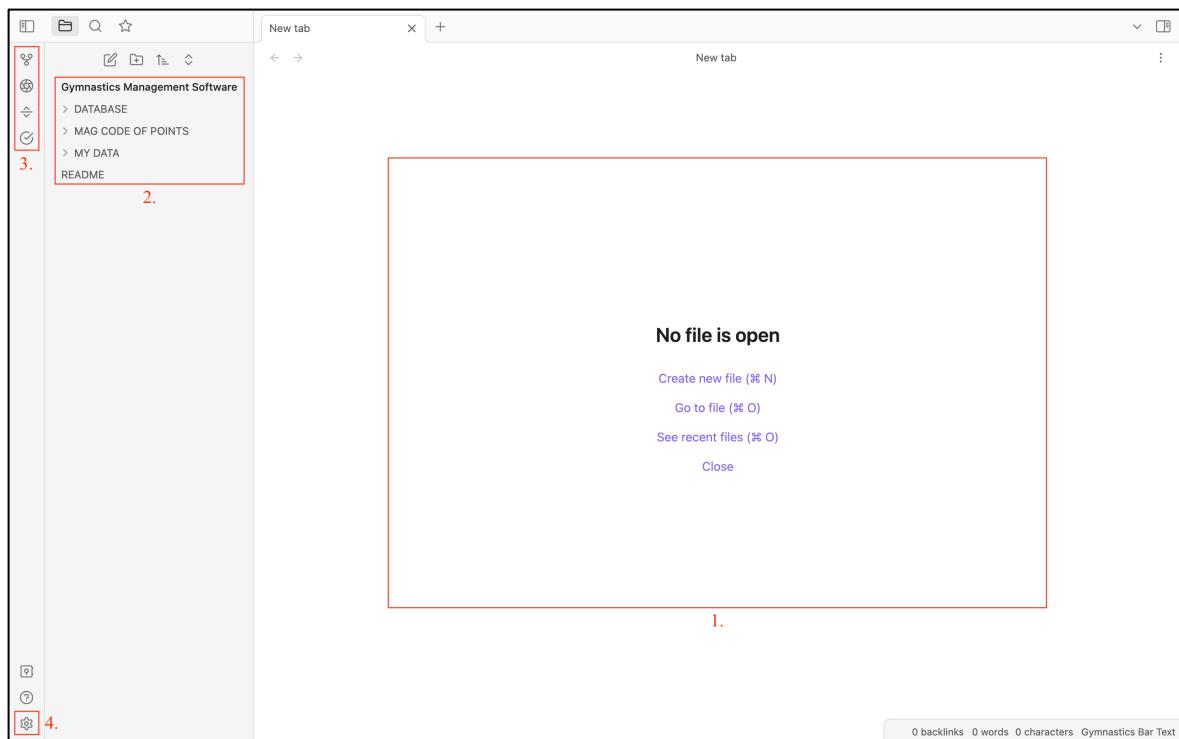


Figure 3.4: Obsidian Interface

The user can open folders from the Sidebar and choose files to open, which are automatically displayed in the File Tab. Above the File Tab (Figure 3.5), there is a bar where the user can see all the files opened and manage them closing and opening other files from the Vault of the software (Sidebar).



Figure 3.5: File Tab bar

3.2 MAG CODE OF POINTS

Folder of the Sidebar concerning the complete regulation of the discipline. In particular, this folder includes all rules and contents of the latest version of the Code of Points "2022-2024 Code of Points of Men's Artistic Gymnastics", approved by the FIG.

Click on the folder "MAG CODE OF POINTS" to see all the files included in, then click on the file of the same name of this folder to open it. This is the primary file of the folder (Figure 3.6), where the user can have a look of the main parts of the Code of Points:

- Apparatus: links to the files of each apparatus of Men's Artistic Gymnastics.
- Exercise Rules: links to the general rules for the correct composition of exercises.
- Abbreviations: table of abbreviations used in the Code of Points.
- References: files PDF of the Code of Points and the Symbology Document, which the software refers to.
- Extensions: file PDF of the Table of Additional Elements (elements completely designed from scratch because not reported in the Tables of the Code of Points, but still valid and accepted by the regulation).

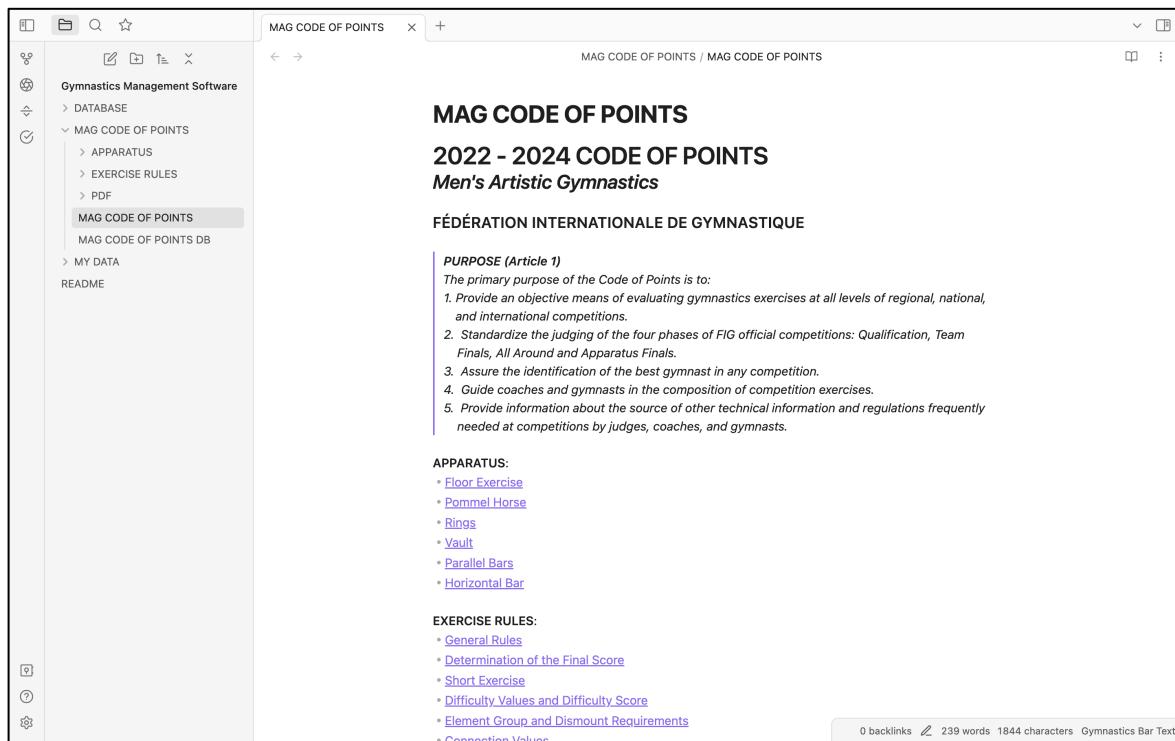


Figure 3.6: MAG CODE OF POINTS primary file

3.2.1 APPARATUS

Folder including all files of apparatus and their performable elements (Figure 3.7). All data related to each gymnastics element has been collected and organized, respecting its own hierarchical priority. In this way, all the elements belonging to the Code of Points have been clustered by associating their apparatus and their element group (EG).

Click on an apparatus folder (named with its own abbreviation) to open it and see all the EG folders included and the file of the apparatus.

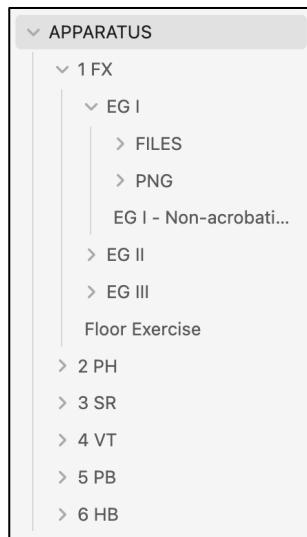


Figure 3.7: APPARATUS folder (Sidebar)

3.2.2 Apparatus File

The file of each apparatus (Figure 3.8) includes the description of the exercise, the links to the files of each EG of the apparatus and all the information about the Difficulty Score (D Score).

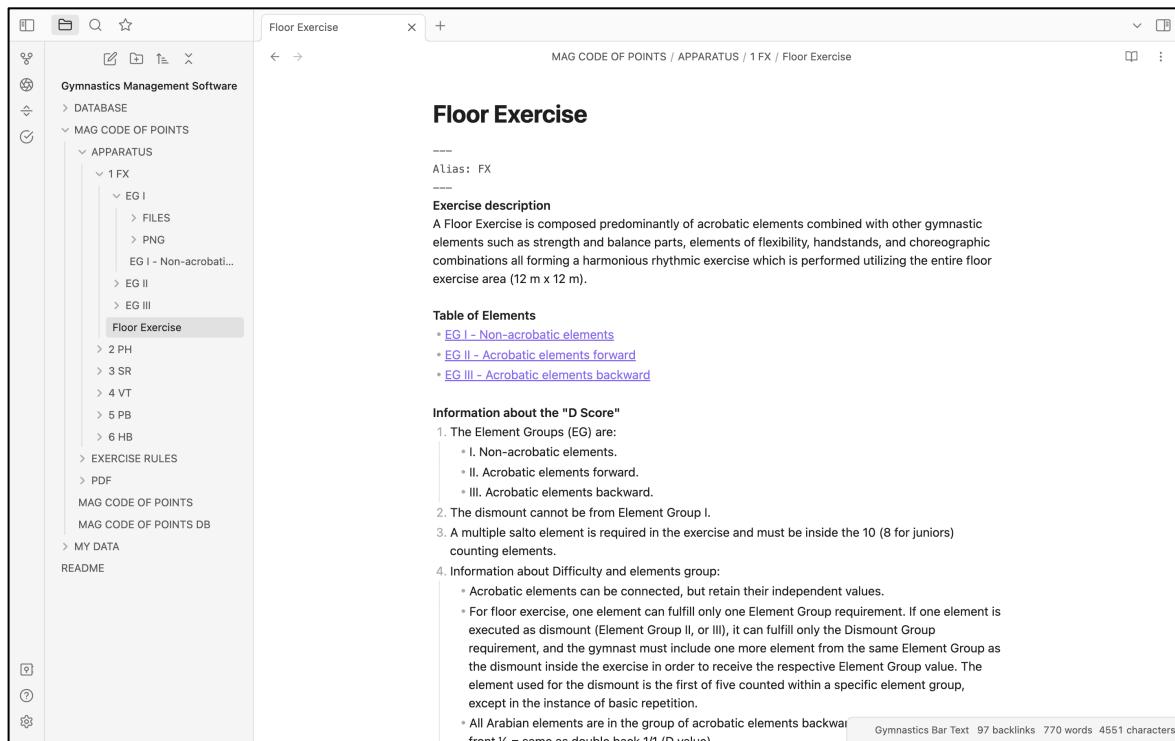
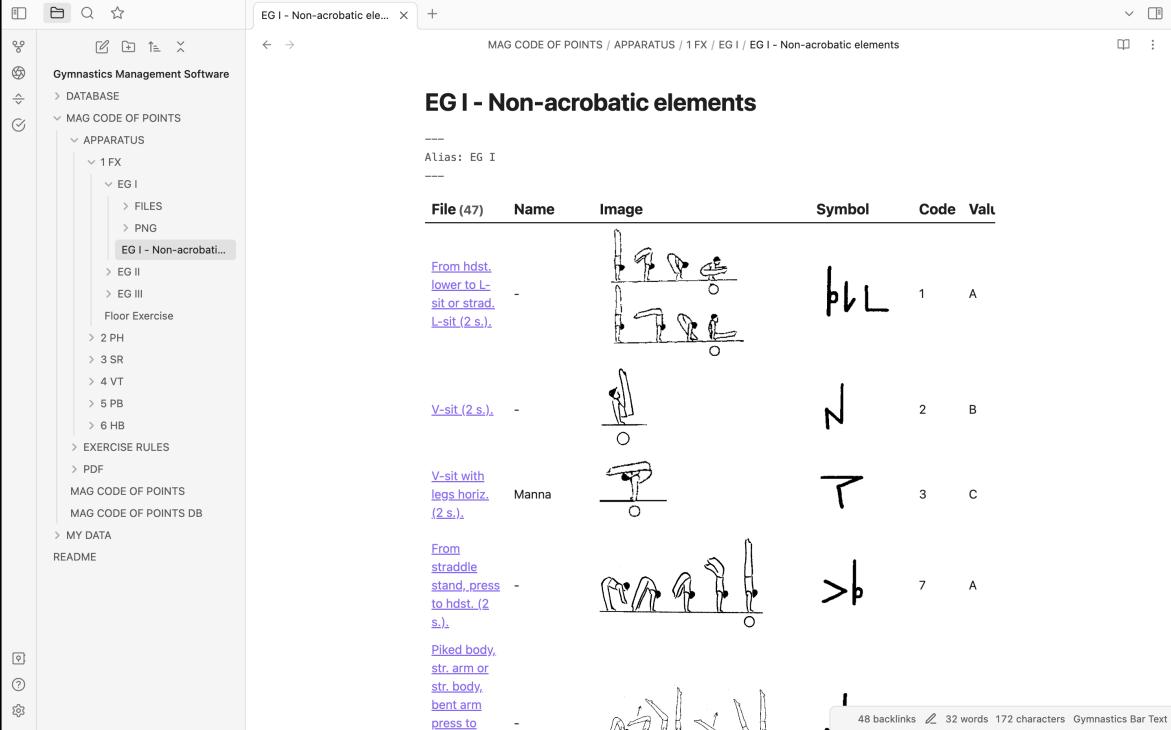


Figure 3.8: Apparatus file (Floor Exercise)

Note that this file is also reachable from the related link in the primary file “MAG CODE OF POINTS” (§ 3.2).

3.2.3 EG File

The file of each EG (Figure 3.9) includes the Table of Elements belonging to its apparatus and its EG. The Table displays all data of the files related to each element, sorted by Code into ascending order. In particular, the user can click the link of the file of the element to directly open it.



The screenshot shows a software interface for gymnastics management. On the left is a sidebar with various menu items like 'DATABASE', 'MAG CODE OF POINTS', 'APPARATUS', 'EXERCISE RULES', 'PDF', 'MAG CODE OF POINTS DB', 'MY DATA', and 'README'. The main area is titled 'EG I - Non-acrobatic elements' and contains a table with the following data:

File (47)	Name	Image	Symbol	Code	Valt
From hdst. lower to L- sit or strad. L-sit (2 s.).	-			1	A
V-sit (2 s.).	-			2	B
V-sit with legs horiz. (2 s.).	Manna			3	C
From straddle stand, press to hdst. (2 s.).	-			7	A
Piked body, str. arm or str. body, bent arm press to	-				

At the bottom right of the table, there are statistics: 48 backlinks, 32 words, 172 characters, and 'Gymnastics Bar Text'.

Figure 3.9: EG file (EG I – Non-acrobatic elements)

Note that all files of the elements are saved in the folder “FILES” of the related EG. The folder “PNG” includes all the PNG files of elements’ images and symbols.

3.2.4 Element File

The file of each element (Figure 3.10) includes all the information of that gymnastics element. In particular, the block on the first line of the note between three hyphens (---) represents Metadata. Metadata is text that's meant to be easily readable by a program, because it has a widely used configuration format called YAML (Yet Another Markup Language), consisting of a key and a corresponding value. This configuration allows each element to be searchable through its own properties, also reported in the main block of the file. These are:

- Element
- Originator's Name
- Image
- Symbol
- Code Identification Number
- Apparatus
- Element Group (EG)
- Difficulty Value (DV)

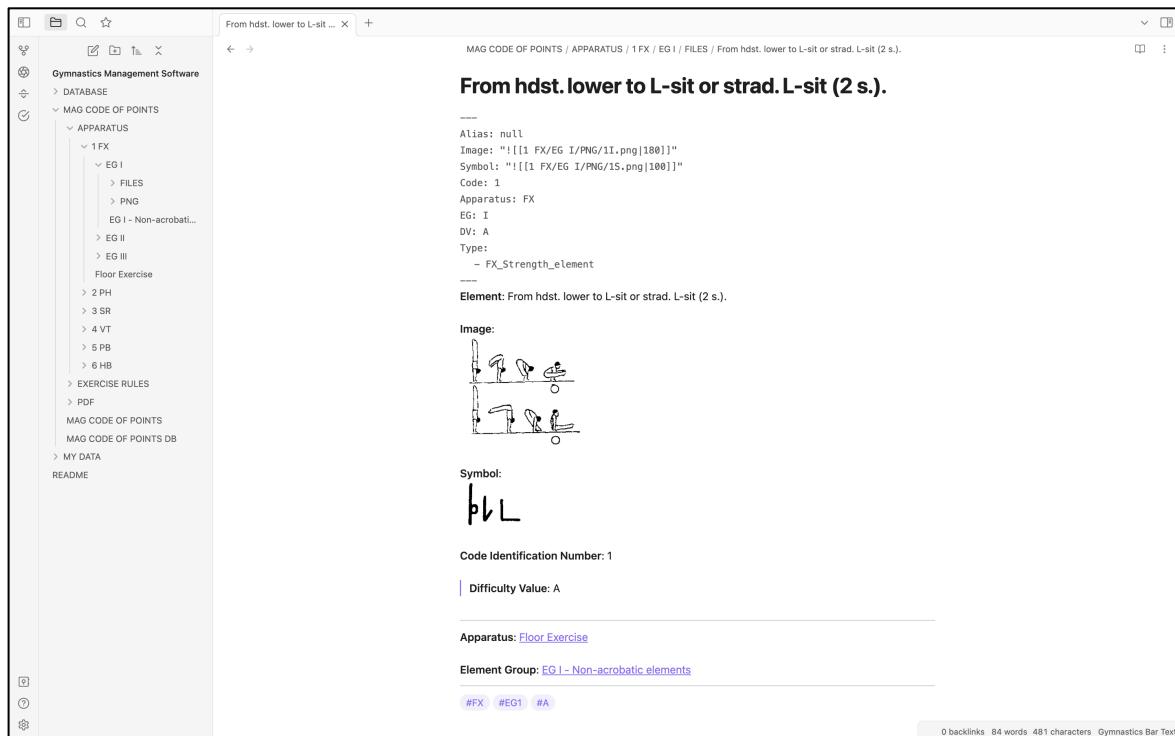


Figure 3.10: Element file (From hdst. lower to L-sit or strad. L-sit (2 s.)).

Finally, at the end of each Element File, there are interactive tags representing some properties of the element. Click on a tag to see every element belonging to that tag's cluster in the Sidebar (Figure 3.11).

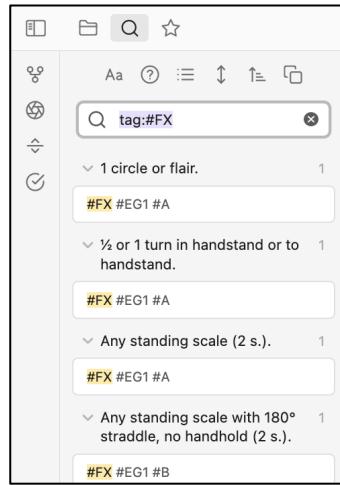


Figure 3.11: Search section with interactive tags (Sidebar)

Note that, also in this section (Sidebar), the user has the possibility to open each element searched through tags just clicking on it.

3.2.5 EXERCISE RULES

Folder including all files of rules for the correct composition of gymnastics exercises. In this section, the user can check the complete regulation reported in the Code of Points just clicking on a Rule File (Figure 3.12).

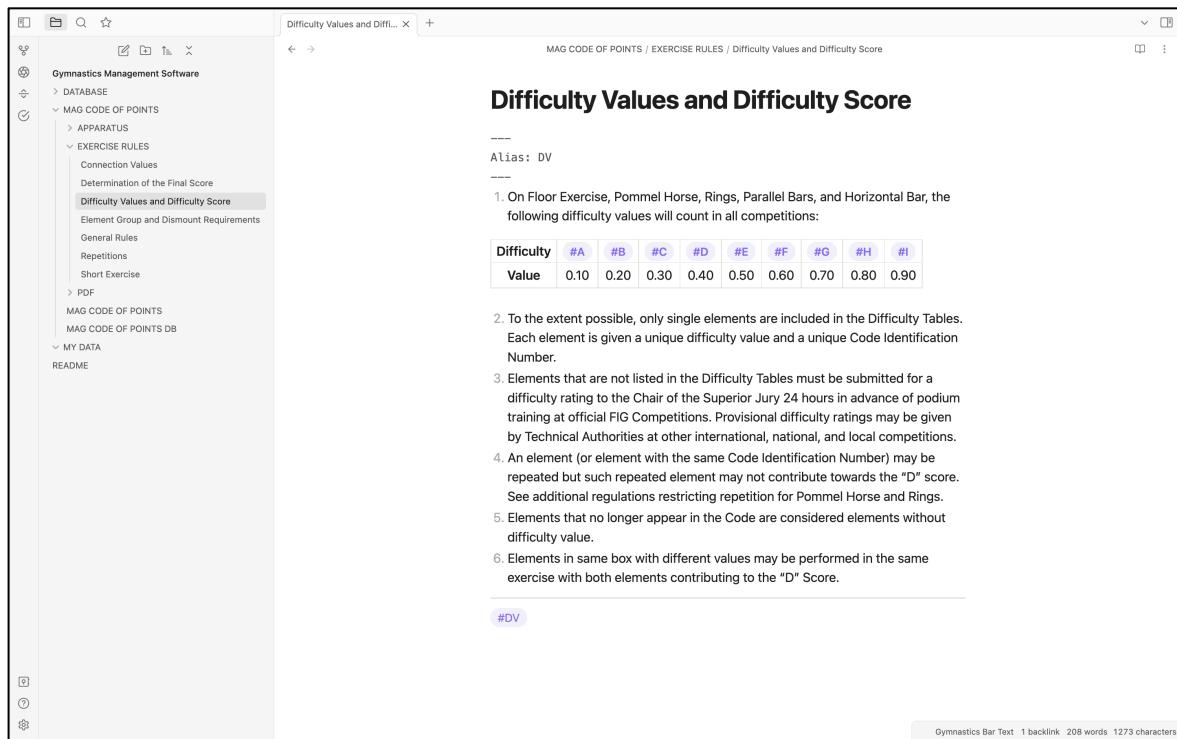


Figure 3.12: Exercise Rules file (Difficulty Values and Difficulty Score)

Moreover, some Rule Files include tables and interactive tags to make the use of the software easier and more dynamic, thanks to the connections between notes through tags and Metadata.

3.2.6 PDF

Folder including all PDF files which the software references to (Figure 3.13). The user can find the same PDF files included in the primary file “MAG CODE OF POINTS” (§ 3.2), that are:

- MAG CODE OF POINTS ("2022-2024 Code of Points of Men's Artistic Gymnastics")
- MAG SYMOLOGY DOCUMENT ("Element Symbols for Men's Artistic Gymnastics")
- TABLE OF ADDITIONAL ELEMENTS

This last PDF file is an extension of the Table of Elements of the Code of Points. In particular, it includes elements completely designed from scratch because not reported in the Tables of the Code of Points. These elements belong to the EG II and EG IV of Pommel Horse (PH) and are still valid and accepted by the regulation (see the section “Information about the D Score” in the Pommel Horse File). In accordance with these rules and with the style adopted by the Code of Points, also respecting the legislation contained in the Symbology Document, these elements have been designed and included in the software.

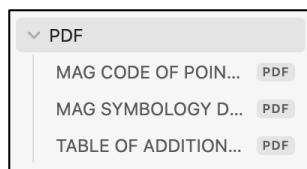


Figure 3.13: PDF folder (Sidebar)

3.2.7 MAG CODE OF POINTS DB

The user can find the “MAG CODE OF POINTS DB” file (Figure 3.14) inside the folder of the same name. This is a database of all gymnastics elements of the Code of Points, which offers multiple possibilities of searching and sorting. Each element shows its Metadata information (§ 3.2.4) and a direct link to the file (saved in its own EG folder of the corresponding apparatus).

The screenshot shows a software window titled "MAG CODE OF POINTS / MAG CODE OF POINTS DB". The left sidebar contains a tree view of the "Gymnastics Management Software" database structure, with "MAG CODE OF POINTS DB" selected. The main area displays a table with the following data:

#	Name	Image	Symbol	Code	Apparatus	EG	DV
1	From hdst. lower to L-sit or strad. L-sit (2 s.)			1	EX	I	A
2	V-sit (2 s.)			2	EX	I	B
3	V-sit with legs horiz. (2 s.) Manna			3	EX	I	C
4	From straddle stand, press to hdst. (2 s.)			7	EX	I	A
5	Piked body, str. arm or str. body, bent arm press to hdst. with legs together (2 s.)			8	EX	I	B
+/-	V-sit (2 s.) and						

At the bottom of the interface, there is a footer with the text: "Gymnastics Bar Text 0 backlinks 2143 words 16469 characters 807/807 'MAG CODE OF POINTS DB'".

Figure 3.14: MAG CODE OF POINTS DB database

To further simplify the consultation of the elements, the database includes a search bar (Figure 3.16) on every property’s column connected to each Metadata information, which also gives advices of selection. Click on the top-left lens icon to open this feature (Figure 3.15).



Figure 3.15: Search icon (MAG CODE OF POINTS DB)

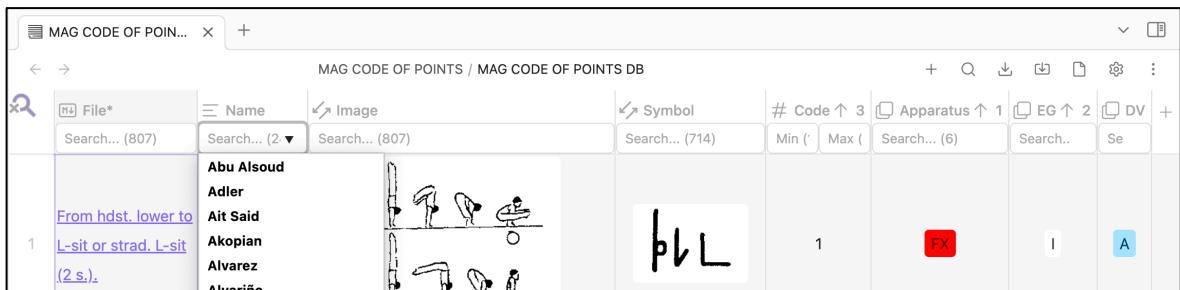


Figure 3.16: Search bar (MAG CODE OF POINTS DB)

Finally, the system has got also a global search bar (Figure 3.18) all over the files and their properties inside the database. This section includes predisposed filter buttons for apparatus and EG that reduce the field of consultable element, supporting the coaches during the creation of exercises. Click on the top-right lens icon “Global search” to open this feature (Figure 3.17).



Figure 3.17: Global search icon (MAG CODE OF POINTS DB)

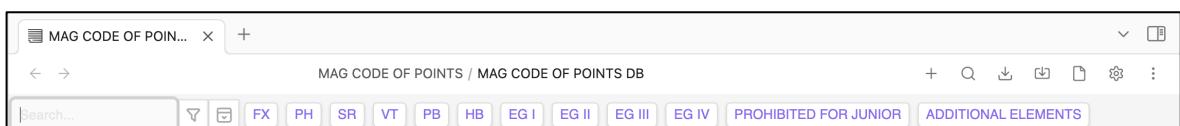


Figure 3.18: Global search bar (MAG CODE OF POINTS DB)

In addition to the filter buttons for apparatus and EG, there are also two other predisposed filter buttons:

- Prohibited for Junior: filter button that displays only gymnastics elements not performable by gymnasts of Junior category.

- Additional Elements: filter button that displays only gymnastics elements included in the “TABLE OF ADDITIONAL ELEMENTS” pdf (§ 3.2.6).

Note that this function is aimed to support the user in the creation of gymnastics exercises (§ 6.2.1), as it reduces the field of elements not only in this database, but also inside “Exercises DB” (§ 5.4).

3.3 DATABASE

Folder of the Sidebar concerning the user-management section of the software (Figure 3.19). In particular, this folder includes all databases useful for coaches, that help managing many different gymnasts and teams with their results and their own exercises. These databases are:

- Exercises DB
- Gymnasts DB
- Results DB
- Teams DB

All these databases are related each other, with the aim of connecting their elements and properties. In this way, for example, the user is able to associate each gymnast to specific competition results and include more gymnasts in the same team. This is possible because both of the databases participate in the bidirectional relation, so all the updates done in a specific database are automatically displayed also in the other one connected.

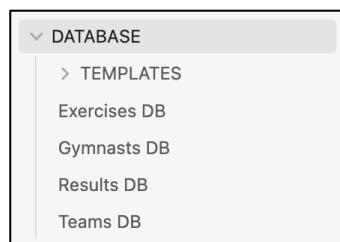


Figure 3.19: DATABASE folder (Sidebar)

3.3.1 TEMPLATES

Folder including all template files automatically used by the user-management databases (Figure 3.20). In particular, these are empty files reporting only Metadata classes and connection properties when a specific New File of each database is created (§ 4.1.1). Every database has a predisposed template for its own New Files:

- New Exercise
- New Gymnast
- New Result
- New Team

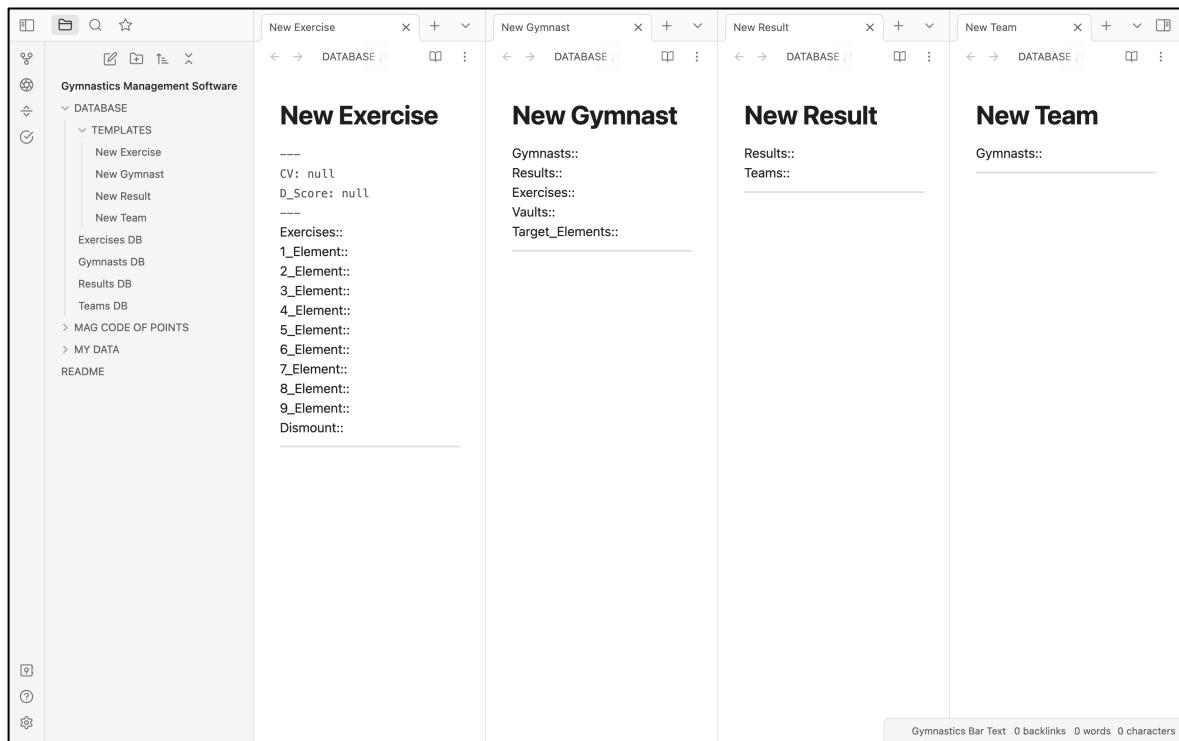


Figure 3.20: Templates files (New Exercise, New Gymnast, New Result, New Team)

Note that this section is automatically used by the system, so these files MUST NOT be changed in any way.

3.4 MY DATA

Folder including all files automatically saved by the user-management databases (Figure 3.21). In particular, all files created through each database are directly saved inside its own folder (of the same name of the database used). Moreover, every update of these files through each database is also automatically registered in their saving folder. These folders are:

- My Exercises
- My Gymnasts
- My Results
- My Teams

Click on a saving folder to see all files included in. Click on a file to open it.

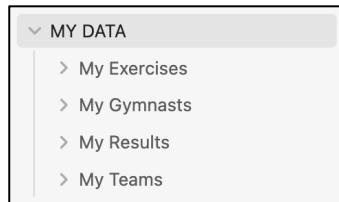


Figure 3.21: MY DATA folder (Sidebar)

Note that the creation and updating of files displayed in the user-management databases is illustrated in “File Update” (§ 4.1).

4 Database Usage

General information about the features included in the user-management section of the software. In particular, this paragraph illustrates the usage of the databases through Obsidian and their main functionalities, in order to explain how to create, update and delete files. Moreover, all databases have query-tools, in order to sort and search files and information included.

These commands are the main functions of use, valid for all the databases of the software, which allow to manage all files displayed through the interface of the databases.

Note that (in the following examples of this paragraph) these general functionalities are used in the “Gymnasts DB” (§ 5.1), but they are also valid in the same way in all user-management databases included in “DATABASE” folder (§ 3.3).

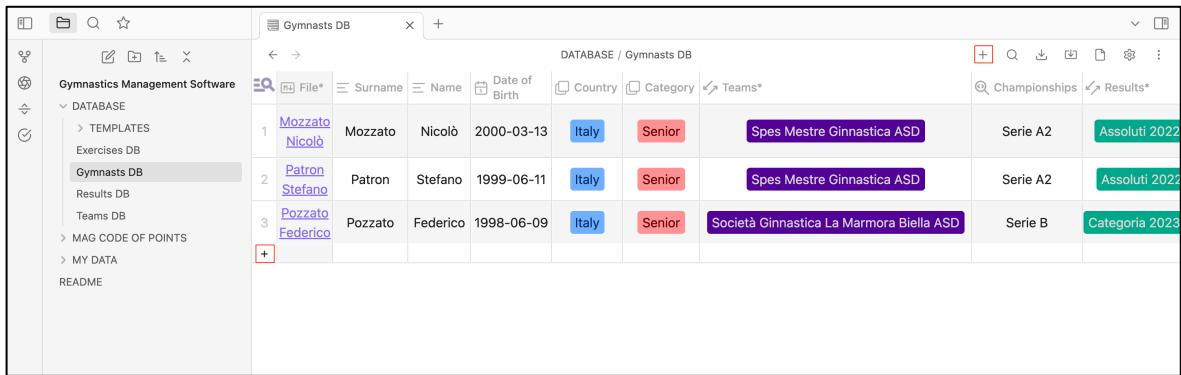
4.1 File Update

The user is free to use all the predisposed databases included in the “DATABASE” folder (§ 3.3), in order to create new files and update the existing ones. All files are automatically saved in their related folders included in the “MY DATA” folder (§ 3.4).

Predisposed buttons included in every database allow to update single files selected, in order to manage all the files of the user.

4.1.1 File Creation

The user can create new files directly through each user-management database. Click on one of the two plus icons (Figure 4.1) included in the database to create a new file adding a new row in the database (Figure 4.2).



	File*	Surname	Name	Date of Birth	Country	Category	Teams*	Championships	Results*
1	Mozzato Nicolò	Mozzato	Nicolò	2000-03-13	Italy	Senior	Spes Mestre Ginnastica ASD	Serie A2	Assoluti 2022
2	Patron Stefano	Patron	Stefano	1999-06-11	Italy	Senior	Spes Mestre Ginnastica ASD	Serie A2	Assoluti 2022
3	Pozzato Federico	Pozzato	Federico	1998-06-09	Italy	Senior	Società Ginnastica La Marmora Biella ASD	Serie B	Categoria 2023

Figure 4.1: Add row icons (Gymnasts DB)

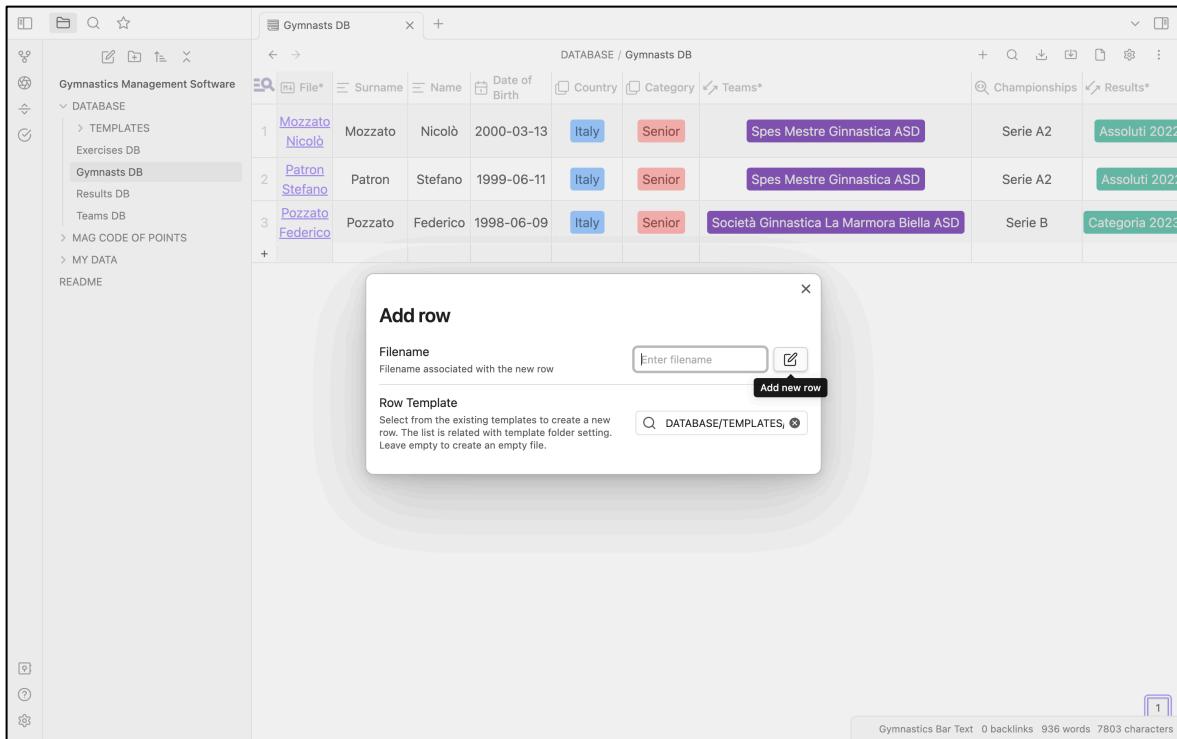


Figure 4.2: Add row notice (Gymnasts DB)

4.1.2 File Opening

The user can have a preview of files displayed in the database and open the file selected. Click on the number (Figure 4.3) of the file's row chose to open the preview of the file (Figure 4.4).

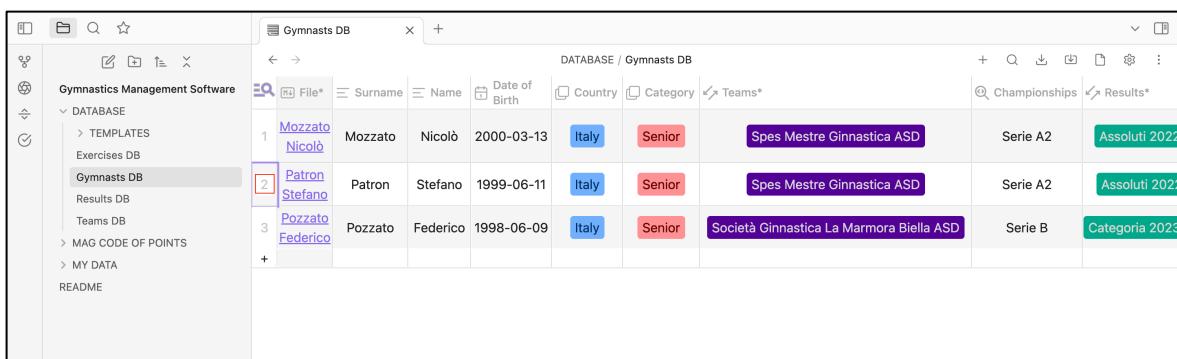


Figure 4.3: Open preview icon (Gymnasts DB)

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The screenshot shows a software application window titled "Gymnasts DB". On the left is a sidebar with a tree view of "Gymnastics Management Software" containing sections like "DATABASE", "TEMPLES", "Exercises DB", "Gymnasts DB" (which is selected), "Results DB", "Teams DB", "MAG CODE OF POINTS", "MY DATA", and "README". The main area displays a table titled "DATABASE / Gymnasts DB" with the following data:

	File*	Surname	Name	Date of Birth	Country	Category	Teams*	Championships	Results*
1	Mozzato Nicolò	Mozzato	Nicolò	2000-03-13	Italy	Senior	Spes Mestre Ginnastica ASD	Serie A2	Assoluti 2022
2	Patron Stefano	Patron	Stefano	1999-06-11	Italy	Senior	Spes Mestre Ginnastica ASD	Serie A2	Assoluti 2022

Below the table, there is a section with links: "Gymnasts: Spes Mestre Ginnastica ASD", "Results: Assoluti 2022 - Patron Stefano", "Exercises: EX - Patron Stefano", "Vaults: Kasamatsu str. w. 1t. or Tsukahara str. w. 2t.", and "Target_Elements:".

At the bottom of the main area, there is another table header "#GYMNAST" followed by a single row of data:

3	Pozzato Federico	Pozzato	Federico	1998-06-09	Italy	Senior	Società Ginnastica La Marmora Biella ASD	Serie B	Categoria 2023
+									

At the bottom right of the main area, there is a status bar with the text: "Gymnastics Bar Text 0 backlinks 952 words 7925 characters 3/3 'Gymnasts DB'".

Figure 4.4: Preview notice (Gymnasts DB)

Click on the link of the file (or on the related chain icon) to open the file (Figure 4.5).

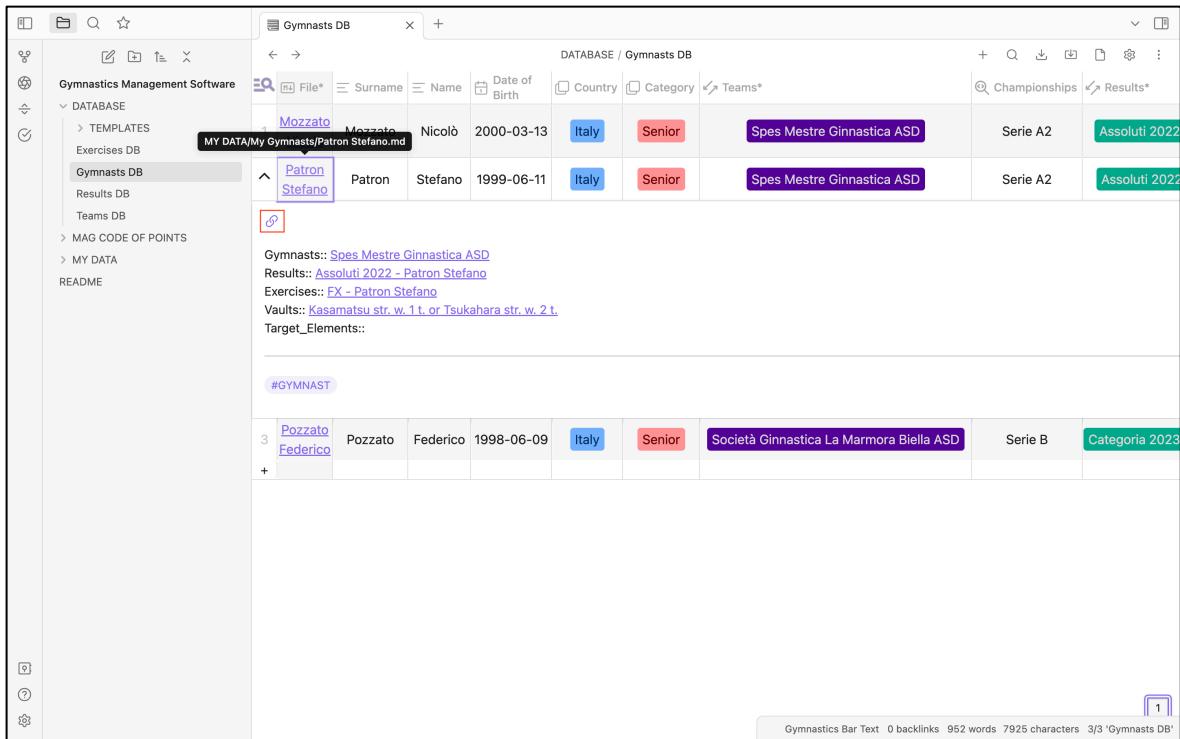


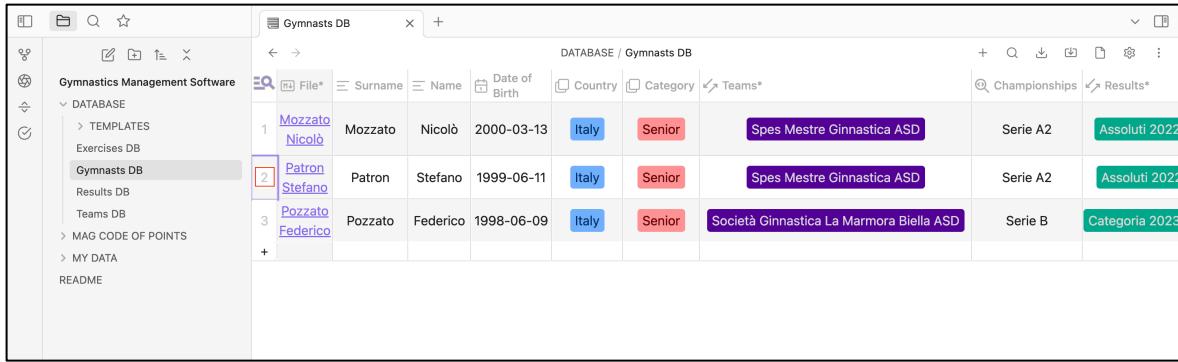
Figure 4.5: Open file icons (Gymnasts DB)

Note that each file of the database can also be opened in the same way of its renomination and deletion, that is through a right-click on the number of the file's row (§ 4.1.3).

4.1.3 File Renomination/Deletion

The user can rename and delete the files displayed in the database. Right-click on the number (Figure 4.6) of the file's row chose to select an action (Figure 4.7).

LEVERAGE 1.0.0 User Guide - © Patron Stefano



	File*	Surname	Name	Date of Birth	Country	Category	Teams*	Championships	Results*
1	Mozzato Nicolò	Mozzato	Nicolò	2000-03-13	Italy	Senior	Spes Mestre Ginnastica ASD	Serie A2	Assoluti 2022
2	Patron Stefano	Patron	Stefano	1999-06-11	Italy	Senior	Spes Mestre Ginnastica ASD	Serie A2	Assoluti 2022
3	Pozzato Federico	Pozzato	Federico	1998-06-09	Italy	Senior	Società Ginnastica La Marmora Biella ASD	Serie B	Categoria 2023

Figure 4.6: Actions select icon (Gymnasts DB)

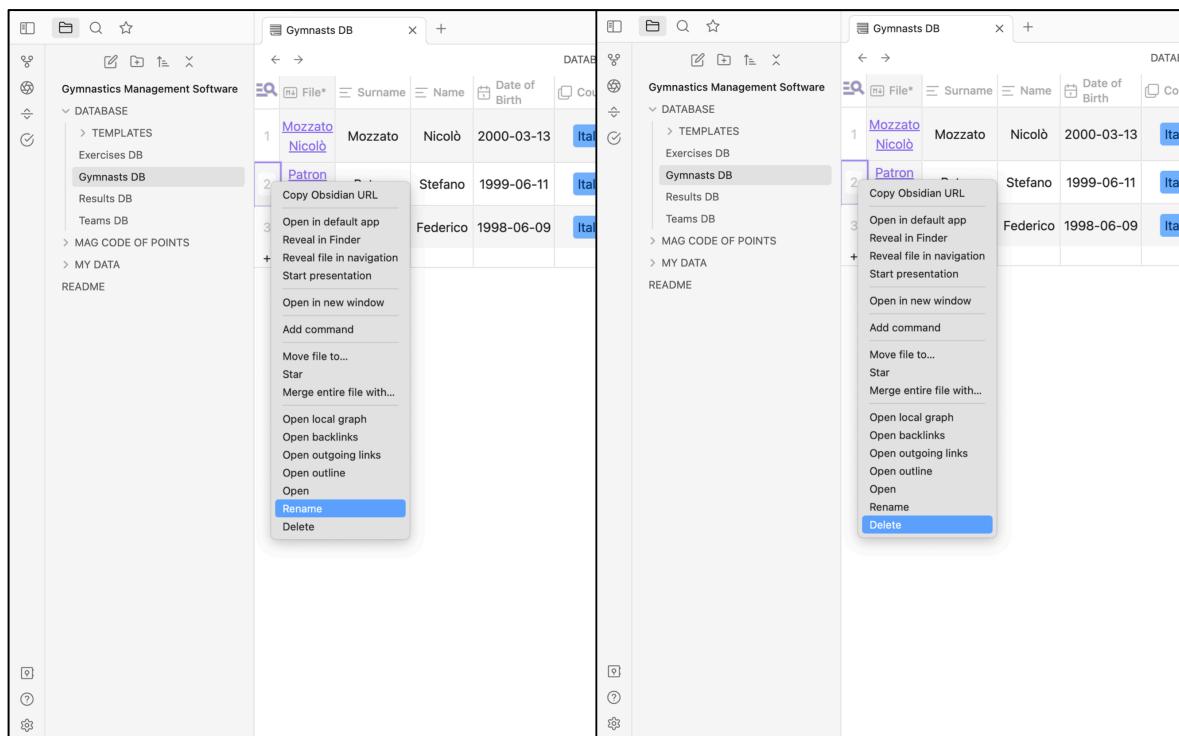


Figure 4.7: Actions select notice: rename action, delete action (Gymnasts DB)

Note that one of the actions selectable is “Open”, which also gives the possibility to open the file selected (§ 4.1.2).

Click on “Rename” to rename the file selected (Figure 4.8).

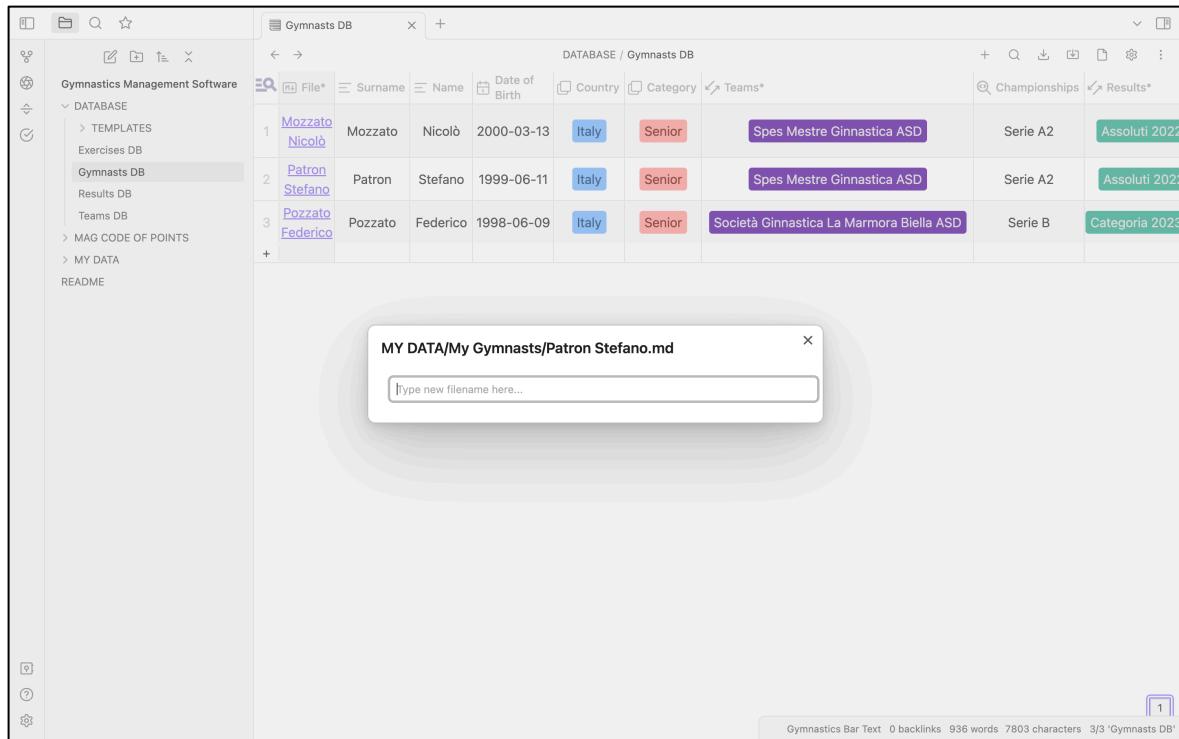


Figure 4.8: Rename notice (Gymnasts DB)

Click on “Delete” to delete the file selected (Figure 4.9).

LEVERAGE 1.0.0 User Guide - © Patron Stefano

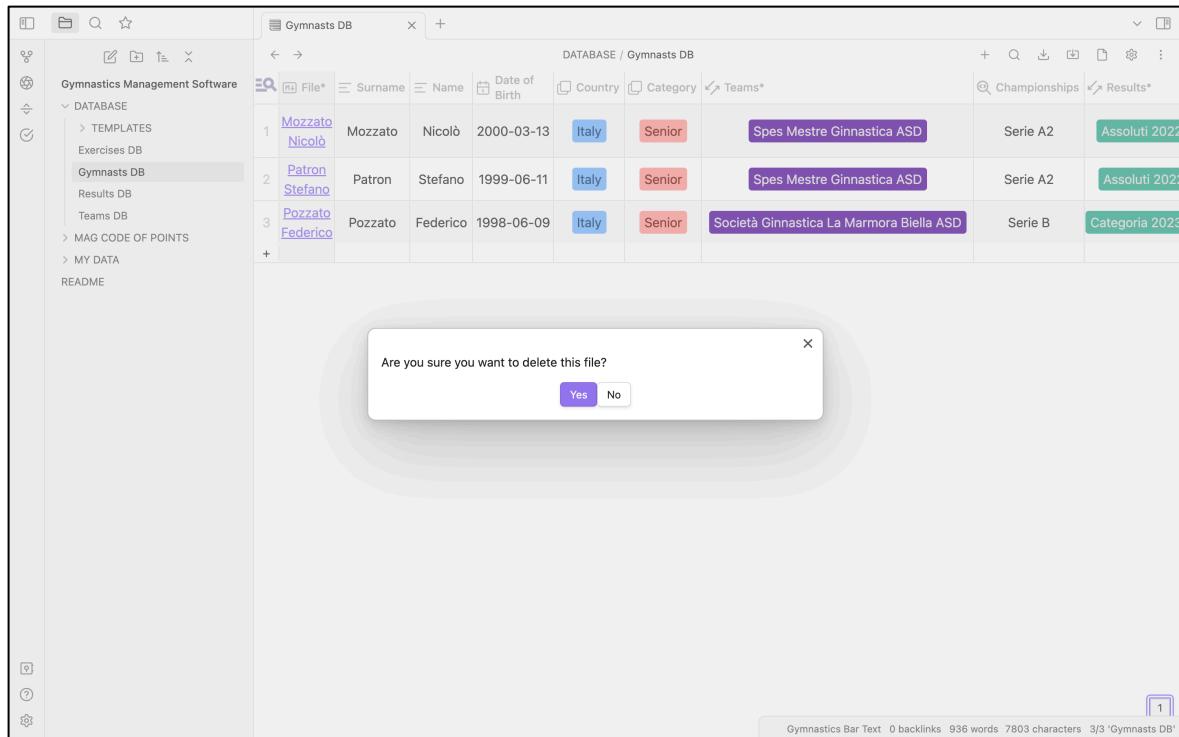


Figure 4.9: Delete notice (Gymnasts DB)

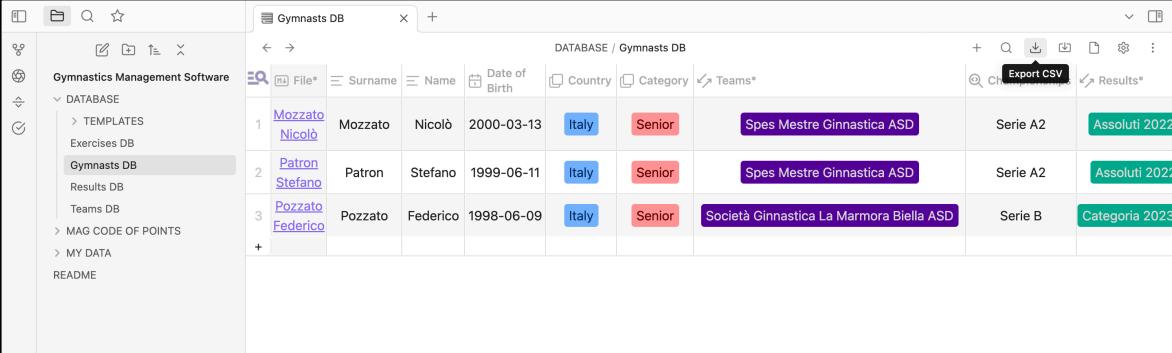
4.2 CSV Exportation/Importation

All user-management databases of the software offer the possibility to export/import Markdown files to/from CSV files.

Note that each CSV file must be in a valid format and requires columns of the same name of the property's columns of the database used.

4.2.1 CSV Exportation

Click on the “Export CSV” icon (Figure 4.10) on the top-right of the database to export all files displayed from the database to a CSV file.



The screenshot shows the Gymnasts DB interface. On the left, there is a sidebar with a tree view of the software's structure, including DATABASE, EXERCISES DB, GYMNASTS DB (which is selected), RESULTS DB, TEAMS DB, MAG CODE OF POINTS, MY DATA, and README. The main area is titled "DATABASE / Gymnasts DB" and contains a table with three rows of data. The columns are: File*, Surname, Name, Date of Birth, Country, Category, and Teams*. The data is as follows:

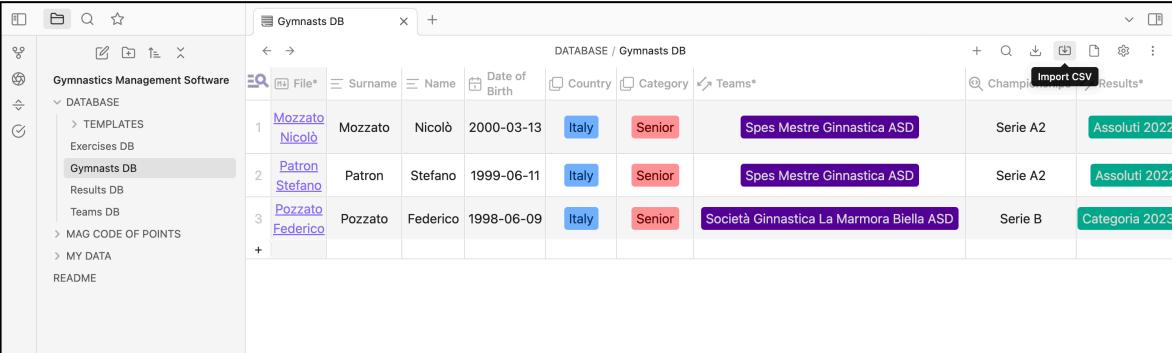
File*	Surname	Name	Date of Birth	Country	Category	Teams*	Serie A2	Assoluti 2022
1 Mozzato Nicolò	Mozzato	Nicolò	2000-03-13	Italy	Senior	Spes Mestre Ginnastica ASD	Serie A2	Assoluti 2022
2 Patron Stefano	Patron	Stefano	1999-06-11	Italy	Senior	Spes Mestre Ginnastica ASD	Serie A2	Assoluti 2022
3 Pozzato Federico	Pozzato	Federico	1998-06-09	Italy	Senior	Società Ginnastica La Marmora Biella ASD	Serie B	Categoria 2023

On the far right of the table, there are icons for Export CSV (highlighted in red), Import CSV, and Results*.

Figure 4.10: Export CSV icon (Gymnasts DB)

4.2.2 CSV Importation

Click on the “Import CSV” icon (Figure 4.11) on the top-right of the database to import all files from a CSV file to the database.



This screenshot is identical to Figure 4.10, showing the Gymnasts DB interface with the same data table and sidebar. The key difference is the presence of the "Import CSV" icon on the far right of the table header, which is highlighted in red.

Figure 4.11: Import CSV icon (Gymnasts DB)

4.3 Properties Usage

Each file included in a user-management database is changeable and its properties can be dynamically updated in every moment. The interface of databases is interactive thanks to property's columns that simplify the User Experience (UX) of the software.

Each database includes columns which have different property types. Some columns have a bidirectional relation between different databases, in order to give the possibility to connect gymnasts to their teams, results and exercises (and vice versa).

Click on a property's column to add information into a file, for example through calendar (Figure 4.12) and select (Figure 4.13) property types, or connections through relation property type (Figure 4.14). This file is automatically updated both in the database and in the saving folder “MY DATA” (§ 3.4).

	Surname	Name	Date of Birth	Country	Category	Teams*	Championships	Results*
1	Mozzato Nicolò	Mozzato	Nicolò	2000-03-13	Italy	Senior	Spes Mestre Ginnastica ASD	Serie A2 Assoluti 2022
2	Patron Stefano	Patron	Stefano	9-06-11	Italy	Senior	Spes Mestre Ginnastica ASD	Serie A2 Assoluti 2022
3	Pozzato Federico	Pozzato	Federico	June 1999	Mo Tu We Th Fr Sa Su		Società Ginnastica La Marmora Biella ASD	Serie B Categoria 2023

Figure 4.12: Calendar property notice (Gymnasts DB)

	Surname	Name	Date of Birth	Country	Category	Teams*	Championships	Results*
1	Mozzato Nicolò	Mozzato	Nicolò	2000-03-13	Italy	Senior	Spes Mestre Ginnastica ASD	Serie A2 Assoluti 2022
2	Patron Stefano	Patron	Stefano	1999-06-11		Senior	Spes Mestre Ginnastica ASD	Serie A2 Assoluti 2022
3	Pozzato Federico	Pozzato	Federico	1998-06-09	None	Senior	Società Ginnastica La Marmora Biella ASD	Serie B Categoria 2023

Figure 4.13: Select property notice (Gymnasts DB)



Figure 4.14: Relation property notice (Gymnasts DB)

Note that all specific values and information accepted from different columns and property types are illustrated in detail in “Database Properties” (§ 5).

4.4 File Search

All user-management databases offer multiple possibilities of searching and sorting through columns and related properties. This is possible because all files' information is saved through Metadata and Internal Links inside files, in order to include query and make every database more interactive.

To further simplify the consultation and the analysis of the files displayed, every database includes a search bar (Figure 4.16) on each property's column, which also gives advices of selection. Click on the top-left lens icon to open this feature (Figure 4.15).

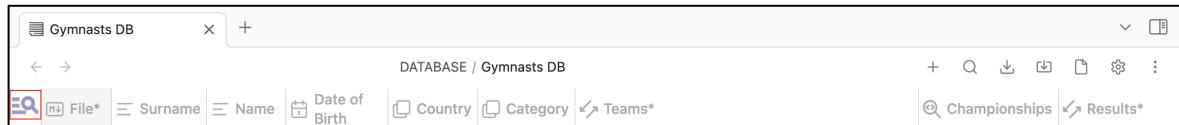


Figure 4.15: Search icon (Gymnasts DB)

	File*	Surname	Name	Date of Birth	Country	Category	Teams*	Championships	Results*
1	Mozzato Nicolò	Mozzato	Nicolò	2000-03-13	Italy	Junior	Spes Mestre Ginnastica ASD	Serie A2	Assoluti 2022
2	Patron Stefano	Patron	Stefano	1999-06-11	Italy	Senior	Spes Mestre Ginnastica ASD	Serie A2	Assoluti 2022

Figure 4.16: Search bar: category search notice (Gymnasts DB)

Moreover, the system has got also a global search bar (Figure 4.18) all over the files and their properties inside the database. Click on the top-right lens icon “Global search” to open this feature (Figure 4.17).

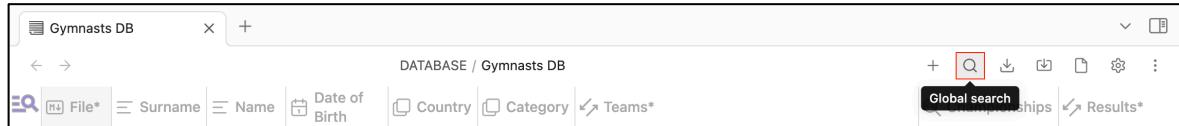


Figure 4.17: Global search icon (Gymnasts DB)

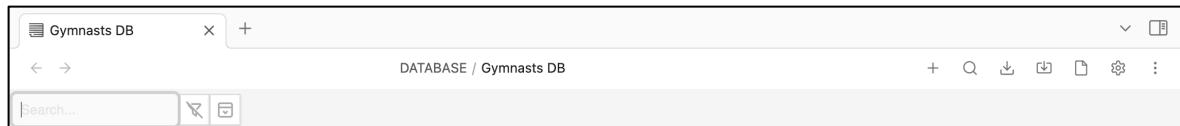


Figure 4.18: Global search bar (Gymnasts DB)

Note that these query-tools are available in all user-management databases in the same way,
similarly to the “MAG CODE OF POINTS DB” (§ 3.2.7).

5 Database Properties

User-management features of the software, that offer the possibility to examine several athletes belonging to different teams and categories at the same time, evaluating their technical characteristics and results achieved during competitions, in order to control and improve the technical planning of competitions.

This paragraph illustrates all the properties included in each database of the software, in order to explain in detail their specific features and requirements. Each database includes columns which has different property types (Figure 5.1). In particular, these are:

- Text: property that accepts text.
- Calendar: property that accepts a date, whose default format is YYYY-MM-DD.
- Select: property that accepts a selection, which can be chose from a list of already existing options.
- Relation: property that shows files belonging to another database. Click on a file to create a connection (normal or bidirectional) between files belonging to different databases.
- Rollup: property that is automatically filled by a predisposed property (belonging to a different database), through an existing relation column.
- Checkbox: property that accepts true and false values, through checking a predisposed box.
- Number: property that accepts numbers.
- Formula: property that is automatically filled by predisposed formulas in JavaScript code, that return dynamic values in function of existing number columns.

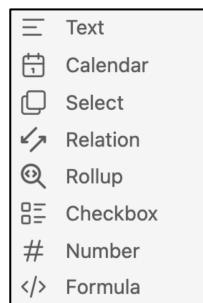


Figure 5.1: Property types

Note that the explanation of the main functionalities of all user-management databases is illustrated in “Database Usage” (§ 4). In particular, the information about connections between files through their own properties is illustrated in “Properties Usage” (§ 4.3).

5.1 Gymnasts DB

Database of all gymnasts, whose files are saved in “MY DATA/My Gymnasts” folder (§ 3.4). Each file displayed includes all properties of the gymnast related (Figure 5.2, Figure 5.3). In particular, the property’s columns and types of this database are:

- File: link to the file.
- Surname: text.
- Name: text.
- Date of Birth: calendar.
- Country: select.
- Category: select.
- Teams: bidirectional relation to “Teams DB” (§ 5.2).
- Championship: rollup from Teams column.
- Results: bidirectional relation to “Results DB” (§ 5.3).
- Exercises: bidirectional relation to “Exercise DB” (§ 5.4).
- Vaults: relation to “MAG CODE OF POINTS DB” (§ 3.2.7).
- Target Elements: relation to “MAG CODE OF POINTS DB” (§ 3.2.7).

The screenshot shows a software interface for managing databases. On the left, there is a sidebar with a tree view of "Gymnastics Management Software" containing sections like DATABASE, TEMPLETAS, Exercises DB, Gymnasts DB (which is selected), Results DB, Teams DB, MAG CODE OF POINTS, MY DATA, and README. The main area is titled "Gymnasts DB" and displays a table with the following data:

	File*	Surname	Name	Date of Birth	Country	Category	Teams*	Championships	Results*
1	Mozzato Nicolò	Mozzato	Nicolò	2000-03-13	Italy	Senior	Spes Mestre Ginnastica ASD	Serie A2	Assoluti 2022
2	Patron Stefano	Patron	Stefano	1999-06-11	Italy	Senior	Spes Mestre Ginnastica ASD	Serie A2	Assoluti 2022
3	Pozzato Federico	Pozzato	Federico	1998-06-09	Italy	Senior	Società Ginnastica La Marmora Biella ASD	Serie B	Categoria 2023

Figure 5.2: Gymnasts DB database (1)

The screenshot shows a software interface titled "Gymnasts DB". On the left is a sidebar with a tree view of "Gymnastics Management Software" containing sections like DATABASE, RESULTS DB, TEAMS DB, MAG CODE OF POINTS DB, MY DATA, and README. The main area is a table titled "DATABASE / Gymnasts DB" with three rows:

	File*	Exercises*	Vaults*	Target Elements*
1	Mozzato Nicolo	J22 - Mozzato Nicolo	PH - Mozzato Nicolo	Kovacs straight or piked with 1 turn. Tkatchev straight with 1t.
2	Patron Stefano	J22 - Patron Stefano	FX - Patron Stefano	Kasamatsu str. w. 1t. or Tsukahara str. w. 2t.
3	Pozzato Federico	J23 - Pozzato Federico	FX - Pozzato Federico	Tsukahara str. w. 1t. or Kasamatsu str. Honma to cross or L-cross (2 s.).

Figure 5.3: Gymnasts DB database (2)

Note that, in order to make easier and faster the search of Vaults and Target Elements, the software includes the “Split Down” plugin (§ 6.2), that helps the user to filter elements included in the “MAG CODE OF POINTS DB” (§ 3.2.7). More information about this feature is illustrated in “Exercise Construction” (§ 6.2.1).

Note the features of each property’s type is illustrated in “Database Properties” (§ 5).

5.2 Teams DB

Database of all teams, whose files are saved in “MY DATA/My Teams” folder (§ 3.4). Each file displayed includes all properties of the team related (Figure 5.4). In particular, the property’s columns and types of this database are:

- File: link to the file.
- Team: select.
- Championship: select.
- Country: select.
- Gymnasts: bidirectional relation to “Gymnasts DB” (§ 5.1).

	Team	Championship	Country	Gymnasts*
1	Società Ginnastica La Marmora Biella ASD	Serie B	Italy	Pozzato Federico
2	Spes Mestre Ginnastica ASD	Serie A2	Italy	Patron Stefano Mozzato Nicolò

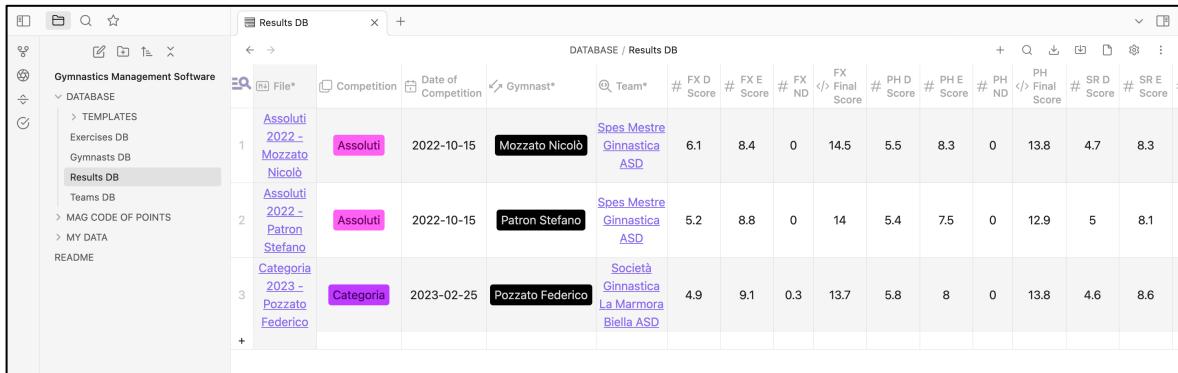
Figure 5.4: Teams DB database

Note the features of each property’s type is illustrated in “Database Properties” (§ 5).

5.3 Results DB

Database of all results, whose files are saved in “MY DATA/My Results” folder (§ 3.4). Each file displayed includes all properties of the result related (Figure 5.5, Figure 5.6). In particular, the property’s columns and types of this database are:

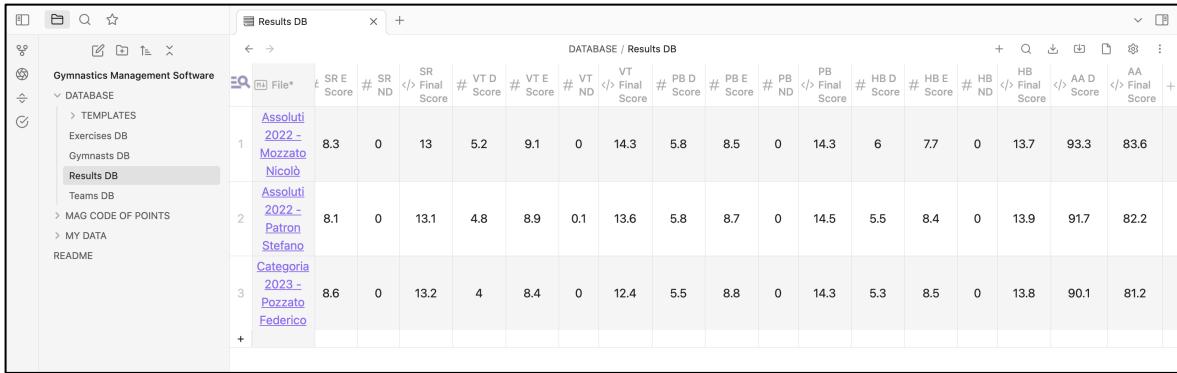
- File: link to the file.
- Competition: select.
- Date of Competition: calendar.
- Gymnast: bidirectional relation to “Gymnasts DB” (§ 5.1).
- Team: bidirectional relation to “Teams DB” (§ 5.2).
- *Apparatus Abbreviation D Score*: number.
- *Apparatus Abbreviation E Score*: number.
- *Apparatus Abbreviation ND*: number.
- *Apparatus Abbreviation Final Score*: formula (sum) of D Score, E Score, ND columns.
- AA D Score: formula (sum) of all D Score columns.
- AA Final Score: formula (sum) of all D Score, E Score, ND columns.



The screenshot shows a software interface for managing gymnastics results. On the left, there's a sidebar with a tree view of the project structure under "Gymnastics Management Software". The "Results DB" node is selected. The main area is titled "Results DB" and contains a table with three rows of data. The columns represent various competition details and scores. Row 1: Assoluti 2022 - Mozzato Nicolò, Date: 2022-10-15, Gymnast: Mozzato Nicolò, Team: Spes Mestre Ginnastica ASD, Scores: FX D: 6.1, FX E: 8.4, FX ND: 0, FX Final Score: 14.5, PH D: 5.5, PH E: 8.3, PH ND: 0, PH Final Score: 13.8, SR D: 4.7, SR E: 8.3. Row 2: Assoluti 2022 - Patron Stefano, Date: 2022-10-15, Gymnast: Patron Stefano, Team: Spes Mestre Ginnastica ASD, Scores: FX D: 5.2, FX E: 8.8, FX ND: 0, FX Final Score: 14, PH D: 5.4, PH E: 7.5, PH ND: 0, PH Final Score: 12.9, SR D: 5, SR E: 8.1. Row 3: Categoria 2023 - Pozzato Federico, Date: 2023-02-25, Gymnast: Pozzato Federico, Team: Società Ginnastica La Marmora Biella ASD, Scores: FX D: 4.9, FX E: 9.1, FX ND: 0.3, FX Final Score: 13.7, PH D: 5.8, PH E: 8, PH ND: 0, PH Final Score: 13.8, SR D: 4.6, SR E: 8.6.

	Competition	Date of Competition	Gymnast*	Team*	# FX D Score	# FX E Score	# FX ND	FX Final Score	# PH D Score	# PH E Score	# PH ND	PH Final Score	# SR D Score	# SR E Score
1	Assoluti 2022 - Mozzato Nicolò	2022-10-15	Mozzato Nicolò	Spes Mestre Ginnastica ASD	6.1	8.4	0	14.5	5.5	8.3	0	13.8	4.7	8.3
2	Assoluti 2022 - Patron Stefano	2022-10-15	Patron Stefano	Spes Mestre Ginnastica ASD	5.2	8.8	0	14	5.4	7.5	0	12.9	5	8.1
3	Categoria 2023 - Pozzato Federico	2023-02-25	Pozzato Federico	Società Ginnastica La Marmora Biella ASD	4.9	9.1	0.3	13.7	5.8	8	0	13.8	4.6	8.6

Figure 5.5: Results DB database (1)



The screenshot shows a software application window titled "Results DB". On the left, there is a sidebar with a tree view of the "Gymnastics Management Software" structure, including "DATABASE", "TEMPLATES", "Exercises DB", "Gymnasts DB", "Results DB" (which is selected), "Teams DB", "MAG CODE OF POINTS", and "MY DATA". Below this is a "README" file. The main area is a table titled "DATABASE / Results DB" with 18 columns. The columns are labeled: SR E Score, # SR ND, SR Final Score, VT D Score, # VT E Score, # VT ND, VT Final Score, # PB D Score, # PB E Score, # PB ND, PB Final Score, # HB D Score, # HB E Score, # HB ND, HB Final Score, # AA D Score, and AA Final Score. There are three rows of data in the table:

	SR E Score	# SR ND	SR Final Score	VT D Score	# VT E Score	# VT ND	VT Final Score	# PB D Score	# PB E Score	# PB ND	PB Final Score	# HB D Score	# HB E Score	# HB ND	HB Final Score	# AA D Score	AA Final Score	
1	Assoluti 2022 - Mozzato Nicolò	8.3	0	13	5.2	9.1	0	14.3	5.8	8.5	0	14.3	6	7.7	0	13.7	93.3	83.6
2	Assoluti 2022 - Patron Stefano	8.1	0	13.1	4.8	8.9	0.1	13.6	5.8	8.7	0	14.5	5.5	8.4	0	13.9	91.7	82.2
3	Categoria 2023 - Pozzato Federico	8.6	0	13.2	4	8.4	0	12.4	5.5	8.8	0	14.3	5.3	8.5	0	13.8	90.1	81.2

Figure 5.6: Results DB database (2)

Note that all *Apparatus Abbreviations* are available in the section “Abbreviations” included in the primary file of “MAG CODE OF POINTS” folder (§ 3.2).

Note the features of each property’s type is illustrated in “Database Properties” (§ 5).

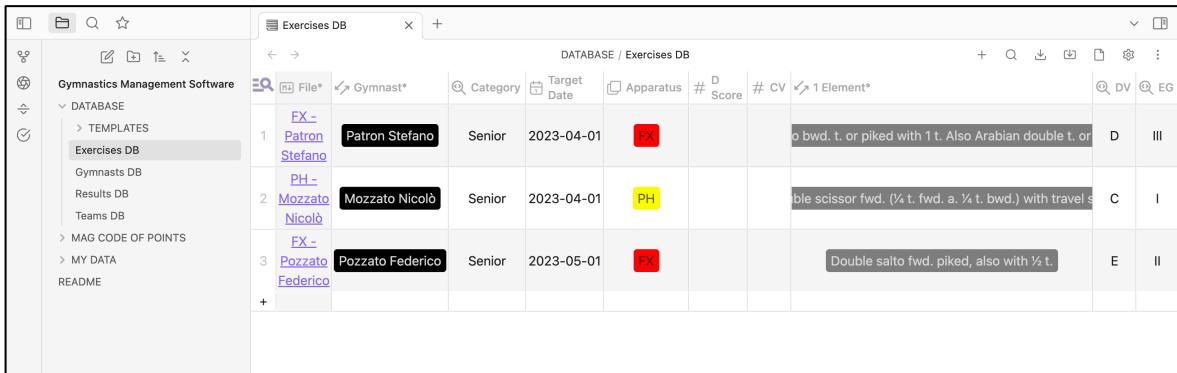
5.4 Exercises DB

Database of all exercises, whose files are saved in “MY DATA/My Exercises” folder (§ 3.4).

Each file displayed includes all properties of the exercises related (Figure 5.7, Figure 5.8,

Figure 5.9). In particular, the property’s columns and types of this database are:

- File: link to the file.
- Gymnast: bidirectional relation to “Gymnasts DB” (§ 5.1).
- Category: rollup from Gymnast column.
- Target Date: calendar.
- Apparatus: select.
- CV: number automatically added by using the “Gymnastics Plugin” (§ 6.3).
- D Score: number automatically added by using the “Gymnastics Plugin” (§ 6.3).
- N° Element: relation to “MAG CODE OF POINTS DB” (§ 3.2.7).
- DV: rollup from N° Element column.
- EG: rollup from N° Element column.
- N°+(N°+1): checkbox.
- Dismount: relation to “MAG CODE OF POINTS DB” (§ 3.2.7).
- DV: rollup from Dismount column.
- EG: rollup from Dismount column.



The screenshot shows a software application window titled "Exercises DB". The left sidebar contains a tree view of the "Gymnastics Management Software" structure, with "Exercises DB" selected. The main area is a table titled "DATABASE / Exercises DB" with the following columns: File*, Gymnast*, Category, Target Date, Apparatus, D Score, CV, 1 Element*, DV, and EG. There are three rows of data:

	File*	Gymnast*	Category	Target Date	Apparatus	D Score	CV	1 Element*	DV	EG
1	FX - Patron Stefano	Patron Stefano	Senior	2023-04-01	FX			bwd. t. or piked with 1t. Also Arabian double t. or	D	III
2	PH - Mozzato Nicolò	Mozzato Nicolò	Senior	2023-04-01	PH			ble scissor fwd. (¼ t. fwd. a. ¼ t. bwd.) with travel s	C	I
3	FX - Pozzato Federico	Pozzato Federico	Senior	2023-05-01	FX			Double salto fwd. piked, also with ½ t.	E	II

Figure 5.7: Exercises DB database (1)

The screenshot shows a software interface for 'Gymnastics Management Software'. On the left, a sidebar lists 'DATABASE' (TEMPLATES, Exercises DB, Gymnasts DB, Results DB, Teams DB), 'MAG CODE OF POINTS', 'MY DATA', and 'README'. The main window is titled 'Exercises DB' and displays a table titled 'DATABASE / Exercises DB'. The table has columns: 'File*', 'Nº', 'Name', 'Description', 'D', 'CV', 'EG', and 'Dismount*'. There are three rows of data:

	Nº	Name	Description	D	CV	EG	Dismount*
1	FX-	Patron Stefano	bwd. t. or piked with 1t. Also Arabian double t. or	D	III	<input type="checkbox"/>	Salto fwd. str. with 2 t.
2	PH-	Mozzato Nicolo	scissor fwd. (¼ t. fwd. a. ¼ t. bwd.) with travel s	C	I	<input type="checkbox"/>	Kehr with 1 turn on 1 pommel.
3	FX-	Pozzato Federico	Double salto fwd. piked, also with ½ t.	E	II	<input type="checkbox"/>	Salto fwd. str. with 2 t.

Figure 5.8: Exercises DB database (2)

The screenshot shows a software interface for 'Gymnastics Management Software'. On the left, a sidebar lists 'DATABASE' (TEMPLATES, Exercises DB, Gymnasts DB, Results DB, Teams DB), 'MAG CODE OF POINTS', 'MY DATA', and 'README'. The main window is titled 'Exercises DB' and displays a table titled 'DATABASE / Exercises DB'. The table has columns: 'File*', 'Nº', 'Name', 'Description', 'D', 'CV', 'EG', and 'Dismount*'. There are three rows of data:

	Nº	Name	Description	D	CV	EG	Dismount*
1	FX-	Patron Stefano	Salto bwd. str. with 1½ t. or 2 t.	C	III	<input type="checkbox"/>	Salto bwd. str. with 3 t.
2	PH-	Mozzato Nicolo	other travel bwd. in cross support to other end	D	III	<input type="checkbox"/>	DSA to hdst. ¾ with 450° or more turn.
3	FX-	Pozzato Federico	Double salto fwd. tucked with 1½ turn.	F	II	<input type="checkbox"/>	Double salto fwd. tucked or tucked with ½ t.

Figure 5.9: Exercises DB database (3)

Note that N° is the rank order of each one of the 9 elements (7 in Junior category) that compose a gymnastics exercise. In particular, $N^{\circ} + (N^{\circ} + 1)$ is the connection between the element in position N and its next (connections between 9° element and dismount is not permitted). More information about exercises is illustrated in “Exercise Composition” (§ 5.4.1).

Note that “D Score” and “CV” columns are automatically filled by using the “Gymnastics Plugin” (§ 6.3).

Note the features of each property’s type is illustrated in “Database Properties” (§ 5).

5.4.1 Exercise Composition

The user has got the possibility to create gymnastics exercises through the “Exercises DB” database, connecting each one to the gymnast who performs the routine.

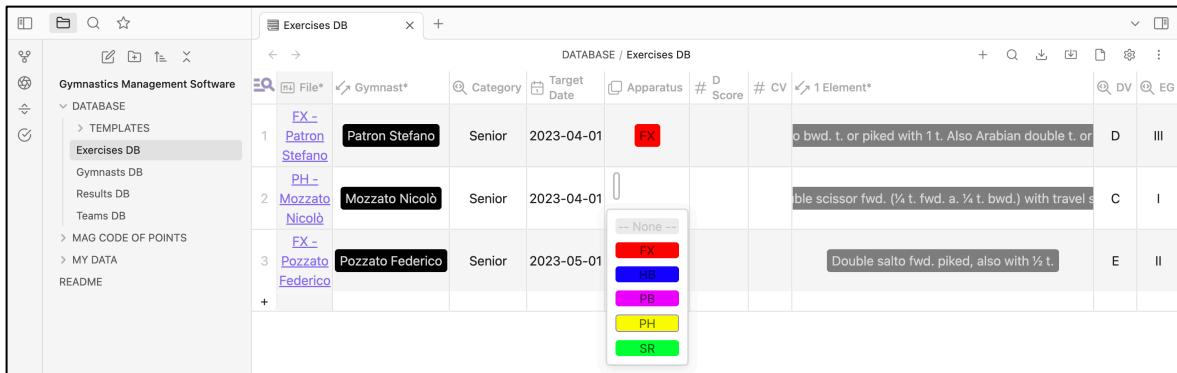
Click on the “Gymnast” property’s column to display all gymnasts included in the “Gymnasts DB” database. Choose a gymnast to fill the property and automatically show its category (Junior or Senior) in the rollup column of the same name (Figure 5.10).

	File*	Gymnast*	Category	Target Date	Apparatus	# D Score	# CV	1 Element*	DV	EG
1	FX - Patron Stefano	Patron Stefano	Senior	2023-04-01	EX			b bwd. t. or piked with 1t. Also Arabian double t. or	D	III
2	PH - Mozzato Nicolò	Mozzato Nicolò	Senior	2023-04-01	PH			ble scissor fwd. (¼ t. fwd. a. ¼ t. bwd.) with travel s	C	I
3	FX - Pozzato Federico	Pozzato Federico	Senior	2023-05-01	EX			Double salto fwd., piked, also with ½ t.	E	II

Figure 5.10: Gymnast and Category columns (Exercises DB)

Note that, in accordance with the rules of the Code of Points included in the section “Rules” of the primary file of “MAG CODE OF POINTS” folder (§ 3.2), in Junior category are permitted only 8 elements (including the dismount). For this reason, the “8 Element” and “9 Element” relation columns included in Junior exercises MUST be empty, otherwise the “Gymnastics Plugin” (§ 6.3) notices an error of composition.

Each exercise also includes the abbreviation of the apparatus where the gymnast performs the gymnastics routine. Click on the “Apparatus” property’s column to choose the abbreviation from a predisposed list of selections (Figure 5.11).



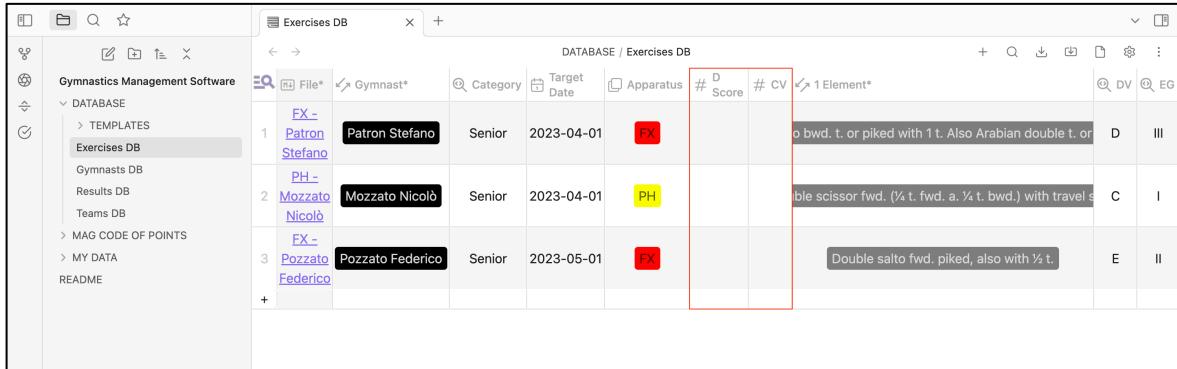
The screenshot shows a software application window titled "Exercises DB". On the left is a sidebar with a tree view of "Gymnastics Management Software" sections: DATABASE (TEMPLATES, Exercises DB), Gymnasts DB, Results DB, Teams DB, MAG CODE OF POINTS, MY DATA, and README. The main area is a table titled "DATABASE / Exercises DB" with columns: File*, Gymnast*, Category, Target Date, Apparatus, # D Score, # CV, and 1 Element*. There are three rows of data:

- Row 1: FX - Patron Stefano, Senior, 2023-04-01, FX, Red, "bwd. t. or piked with 1t. Also Arabian double t. or", D, III.
- Row 2: PH - Mozzato Nicolò, Senior, 2023-04-01, PH, Yellow, "double scissor fwd. (¼ t. fwd. a. ¼ t. bwd.) with travel s", C, I.
- Row 3: FX - Pozzato Federico, Senior, 2023-05-01, FX, Red, "Double salto fwd. piked, also with ½ t.", E, II.

A dropdown menu labeled "None" is open over the "Apparatus" column, listing categories: FX (Red), HB (Blue), PB (Purple), PH (Yellow), and SR (Green).

Figure 5.11: Apparatus column (Exercises DB)

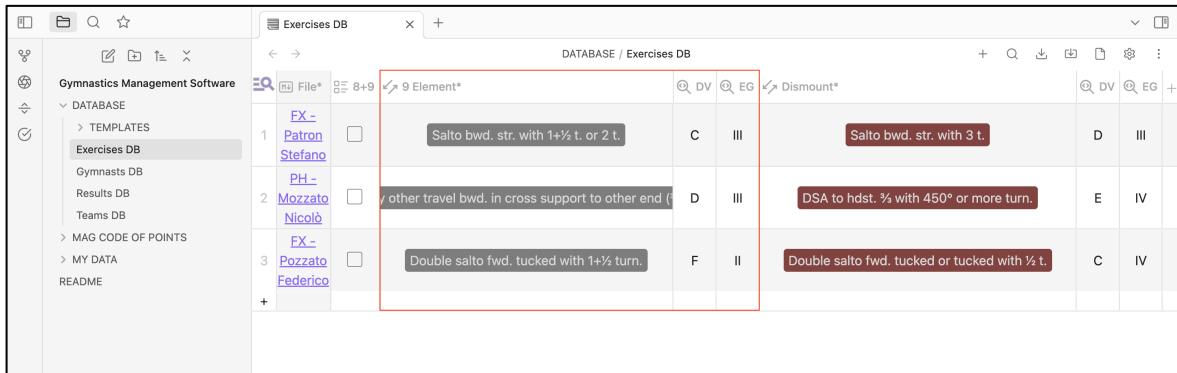
The “D Score” and “CV” number columns include the Difficulty Score and the Connection Values of the exercise (Figure 5.12). This feature is available through the usage of the “Gymnastics Plugin” (§ 6.3), which automatically calculates these values and fills these properties in the exercise checked.



This screenshot is identical to Figure 5.11, but the "D Score" and "# CV" columns are highlighted with a red rectangular box.

Figure 5.12: D Score and CV columns (Exercises DB)

Moreover, there are 10 relation columns (9 “Element” and 1 “Dismount”) connected to the “MAG CODE OF POINTS DB” database, where the user can search elements from all over the Code of Points of Men’s Artistic Gymnastics. Each one of these columns has got 2 related rollup columns, which automatically display the Difficulty Value (DV) and the Element Group (EG) of the element included in the relation column (Figure 5.13). These rollup columns also help the user to choose elements carefully during the construction of the routine of the gymnast.



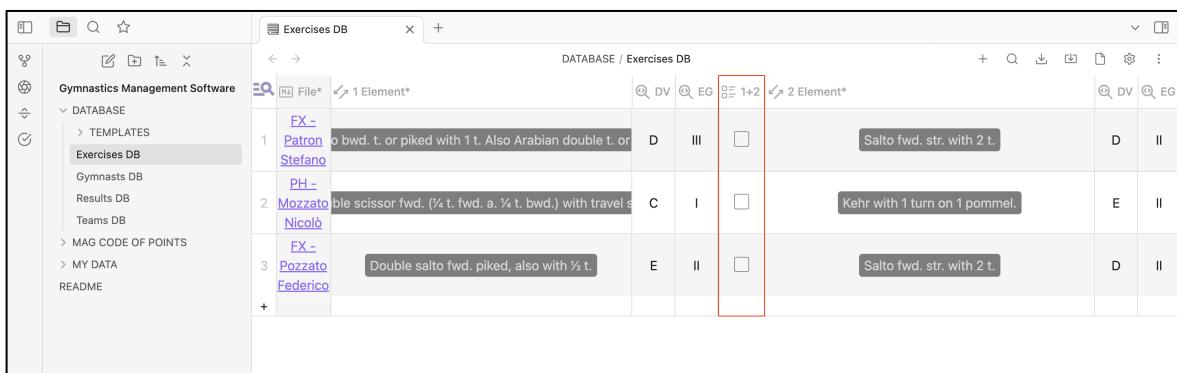
The screenshot shows a software interface titled "Exercises DB". On the left, there's a sidebar with "Gymnastics Management Software" and "DATABASE" sections. The main area displays a table with three rows of data. Each row contains an exercise name, its description, and performance details across columns for DV (Difficulty Value) and EG (Execution Grade). A red box highlights the first row, which includes the element "Salto bwd. str. with 1½ t. or 2 t.", its description, and its DV and EG values.

	File*	$\text{D} = 8+9$	9 Element*	Q_DV	Q_EG	Dismount*	Q_DV	Q_EG
1	FX - Patron Stefano		Salto bwd. str. with 1½ t. or 2 t.	C	III	Salto bwd. str. with 3 t.	D	III
2	PH - Mozzato Nicolò		... other travel bwd. in cross support to other end ...	D	III	DSA to hdst. % with 450° or more turn.	E	IV
3	FX - Pozzato Federico		Double salto fwd. tucked with 1½ turn.	F	II	Double salto fwd. tucked or tucked with ½ t.	C	IV

Figure 5.13: Element, DV and EG columns (Exercises DB)

Note that, in order to make easier and faster the construction of gymnastics exercises, the software includes the “Split Down” plugin (§ 6.2), that helps the user to filter elements included in the “MAG CODE OF POINTS DB” (§ 3.2.7). More information about this feature is illustrated in “Exercise Construction” (§ 6.2.1).

Finally, there are some checkbox columns between each 2 “Element” property’s columns (Figure 5.14). In each one of these columns, the user can include a Connection between the 2 elements related just clicking on the checkbox of the exercise analyzed.



This screenshot shows the same software interface as Figure 5.13, but with a different set of data. The table now has two additional columns between the DV and EG columns, labeled "1 Element*" and "2 Element*". These columns contain checkboxes. A red box highlights the second row, where the "1 Element*" column contains a checkbox next to the text "bwd. t. or piked with 1 t. Also Arabian double t. or", and the "2 Element*" column contains a checkbox next to the text "Salto fwd. str. with 2 t.". The rest of the table structure remains the same, with descriptions and performance details for each exercise.

	File*	$\text{D} = 1+2$	1 Element*	Q_DV	Q_EG	$\text{D} = 1+2$	2 Element*	Q_DV	Q_EG
1	FX - Patron Stefano		bwd. t. or piked with 1 t. Also Arabian double t. or	D	III		Salto fwd. str. with 2 t.	D	II
2	PH - Mozzato Nicolò		... scissor fwd. (¼ t. fwd. a. ¼ t. bwd.) with travel ...	C	I		Kehr with 1 turn on 1 pommel.	E	II
3	FX - Pozzato Federico		Double salto fwd. piked, also with ½ t.	E	II		Salto fwd. str. with 2 t.	D	II

Figure 5.14: Connection column (Exercises DB)

Note that, in accordance with the rules of the Code of Points included in the section “Rules” of the primary file of “MAG CODE OF POINTS” folder (§ 3.2), connections between elements are permitted only on Floor Exercise (FX) and on Horizontal Bar (HB). For this reason, any connection included in exercises on other apparatus is not considered by the “Gymnastics Plugin” (§ 6.3).

6 Plugins Usage

Additional tools included in the “Ribbon” section of the UI of the software (§ 3.1). This section is part of the left Sidebar that is always visible, even if the left Sidebar is closed.

Plugins are particular tools that improve the existing features of the software or add new functionality to it. There are both official Obsidian plugins and plugins developed by third parts.

The following paragraphs illustrate the using of each plugin of the software and its main features.

Click on the plugin’s icon included in the “Ribbon” section (Figure 6.1) to use the functionality of that plugin.

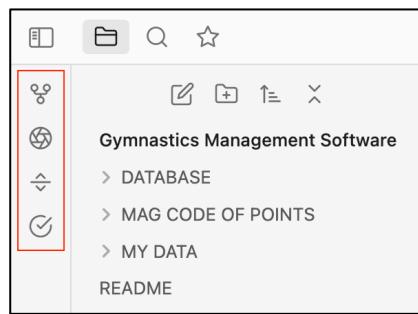


Figure 6.1: Plugins icons (Ribbon)

6.1 Graph View

Official Obsidian plugin that gives the possibility to visualize all the connections between the files included in the vault of the software. All information is displayed through Nodes (that represent notes/files) and Lines (that represent connections/internal links between two nodes). The more nodes that reference a given node, the bigger it gets.

The predisposed graph of the software shows all data related to each gymnastics element, collected and organized respecting its own hierarchical priority in the Code of Points (Figure 6.2). In this way, all the elements are clustered by associating their apparatus and their element group (EG). To simplify the visualization of the graph, each apparatus-cluster has got its own color:

- Red for Floor Exercise (FX)
- Yellow for Pommel Horse (PH)
- Green for Rings (SR)
- Light Blue for Vault (VT)
- Light Purple for Parallel Bars (PB)
- Blue for Horizontal Bar (HB)

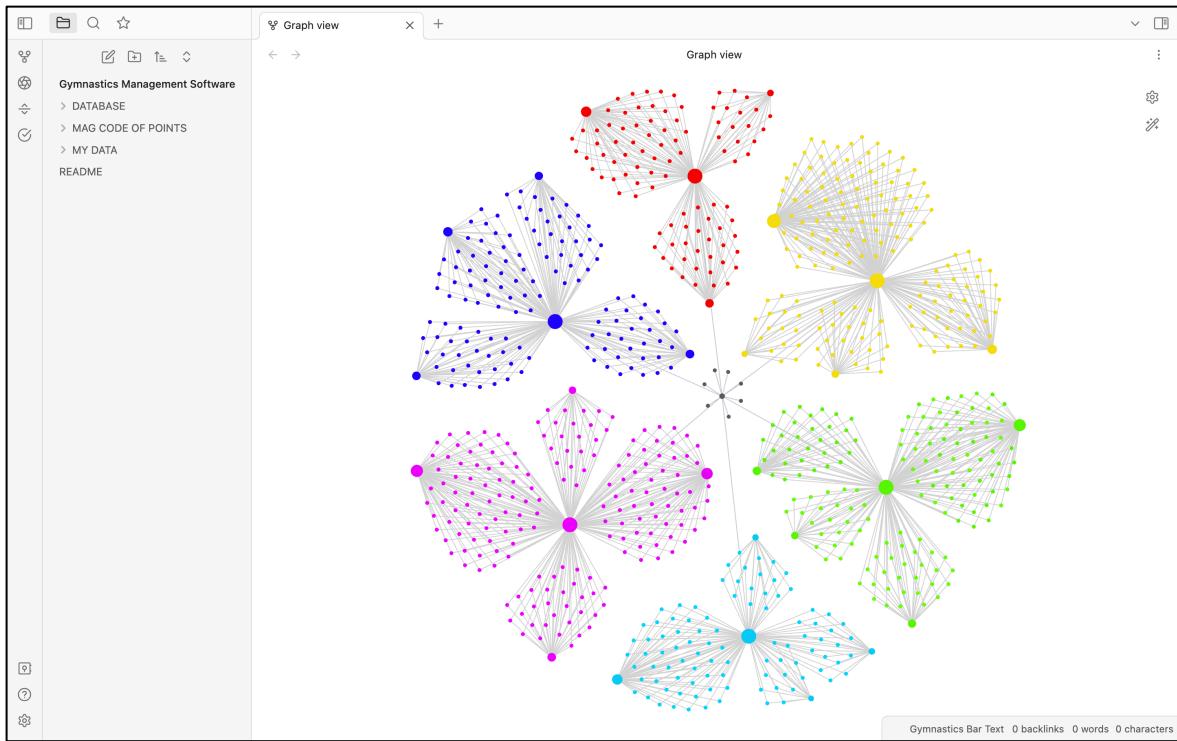


Figure 6.2: Graph view

Note that the small not colored nodes, connected with the central node of the primary file “MAG CODE OF POINTS”, represent the internal links to each file of “EXERCISES RULES” folder (§ 3.2.5).

The user has the possibility to interact with nodes of the graph. Hover over each node to highlight its connections (Figure 6.3) and click a node to open its related file.

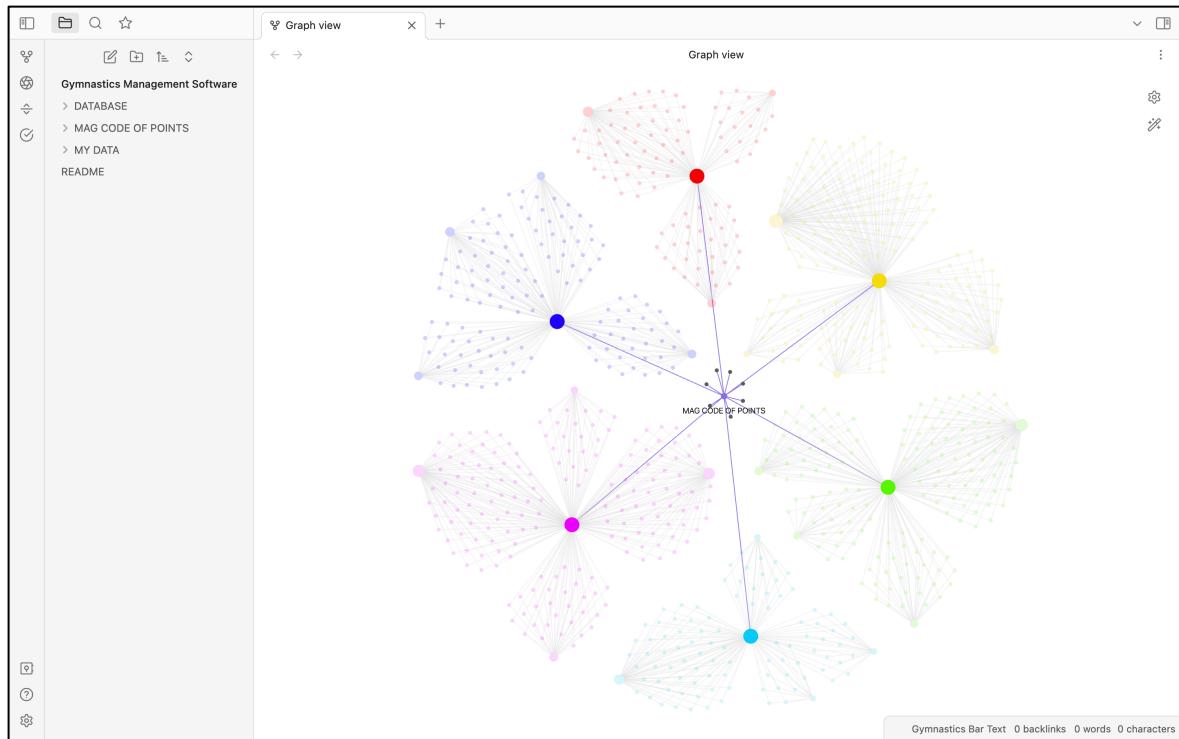


Figure 6.3: MAG CODE OF POINTS file's connections (Graph view)

Zoom in and out using the scroll wheel on the mouse to navigate around the graph and move the graph around by dragging it with the mouse cursor (Figure 6.4).

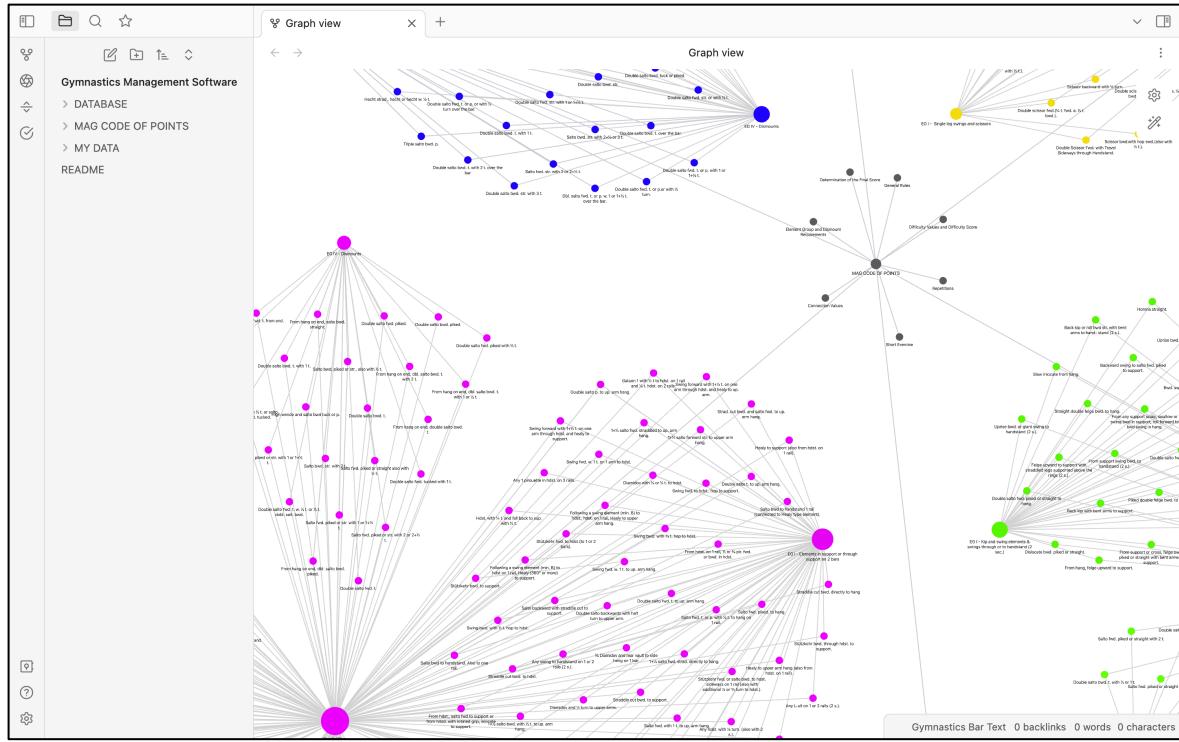


Figure 6.4: Nodes and connections (Graph view)

On the right side of the interface there are two interactive buttons. Click on the magic-wand icon “Start timelapse animation” (Figure 6.5) to display all the past graph’s updates of new nodes and connections through an animation (Figure 6.6).

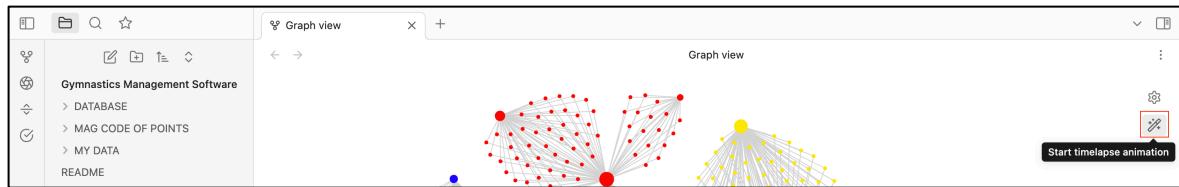


Figure 6.5: Start timelapse animation icon (Graph view)

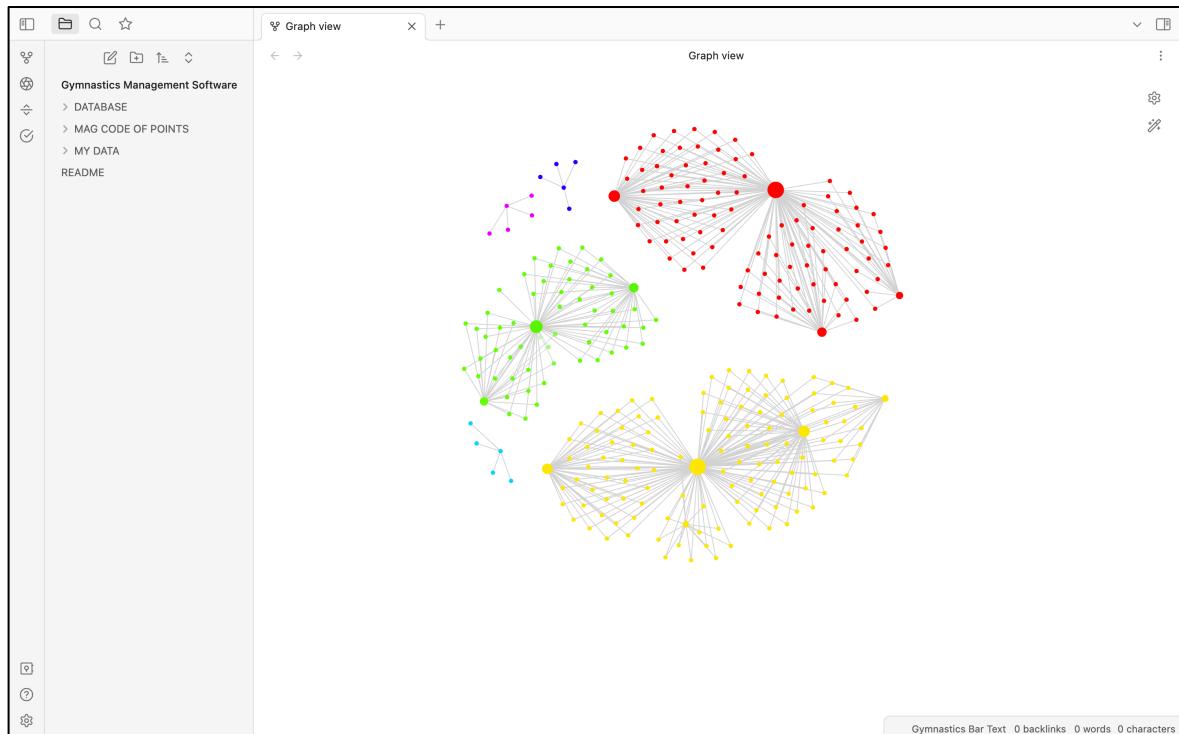


Figure 6.6: Timelapse animation (Graph view)

Click on the setting icon “Open graph settings” (Figure 6.7) to show the legend of cluster’s colors (“Groups” section) and search/filter nodes (“Filters” section) (Figure 6.8).

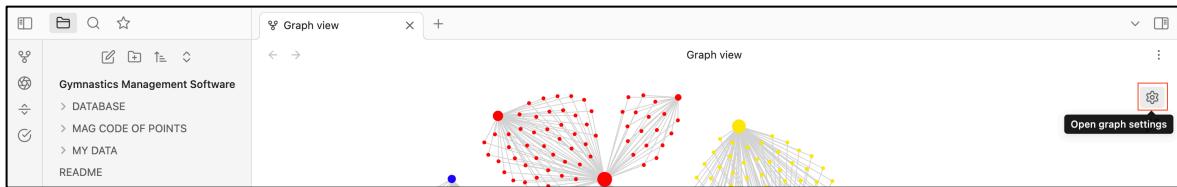


Figure 6.7: Open graph settings icon (Graph view)

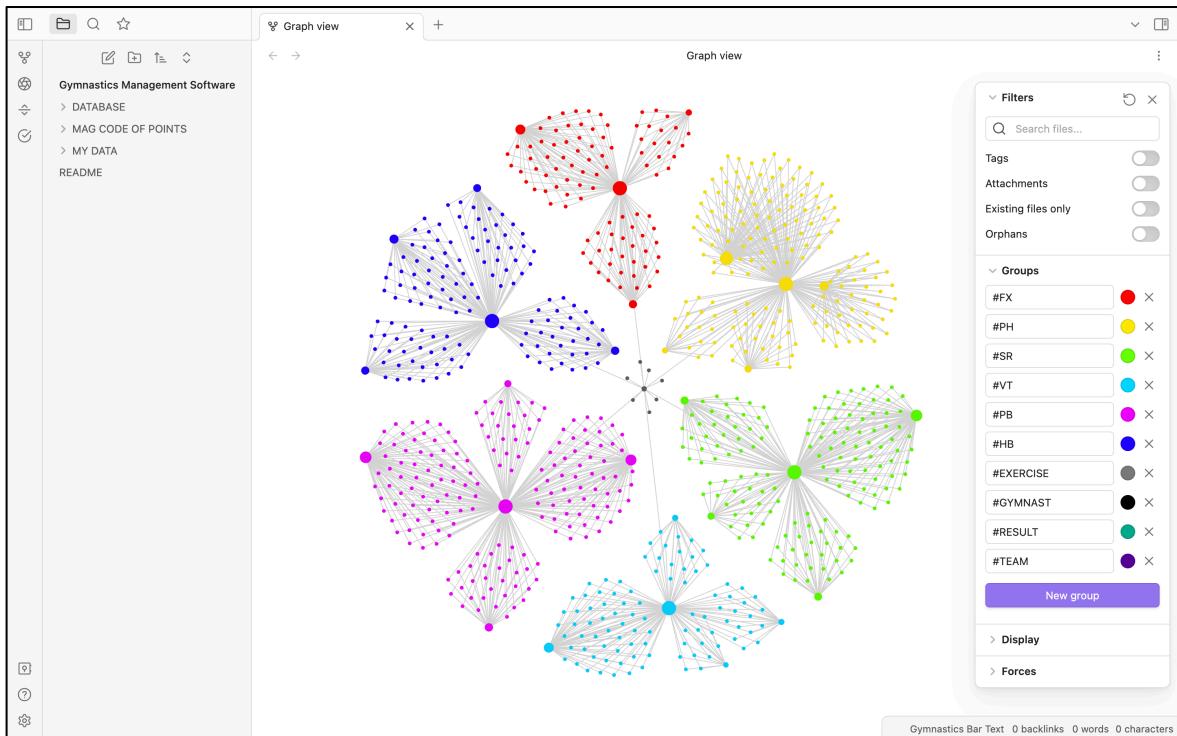


Figure 6.8: Graph settings (Graph view)

In particular, the “Groups” section also includes other cluster’s colors representing each type of file manageable by the user through user-management databases. Moreover, all new files and connections created through these databases are automatically updated in new graph’s nodes and lines.

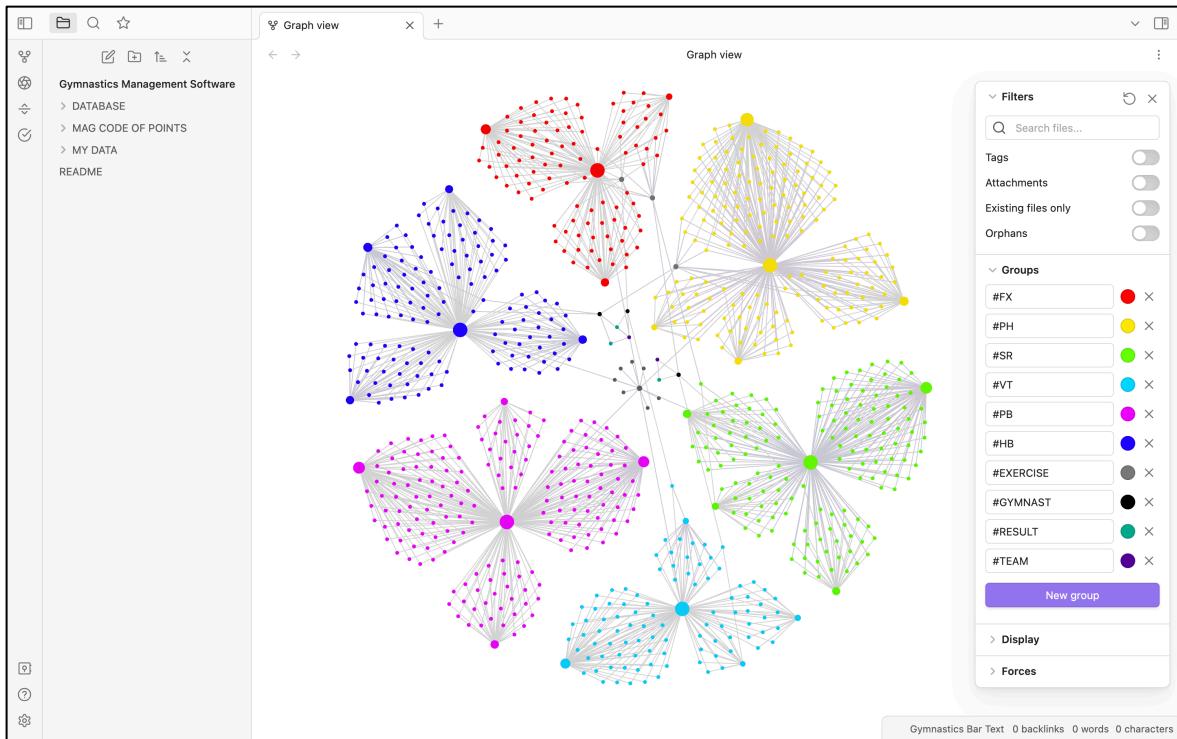


Figure 6.9: DEMO files (Graph view)

Note that the software has got some predisposed DEMO data (Figure 6.9), already included in the saving folder “MY DATA” (§ 3.4), in order to help the user to start using the software. In particular, these data represent DEMO files of exercises, gymnasts, results and teams, with also their connections (displayed through the graph). These files can be deleted just following the files-deletion steps illustrated in “File Renomination/Deletion” (§ 4.1.3).

6.1.1 Graph View Opening

Click on the plugin's icon “Open graph view” included in the “Ribbon” section (Figure 6.10) to visualize the graph of all files included in the software (Figure 6.11).

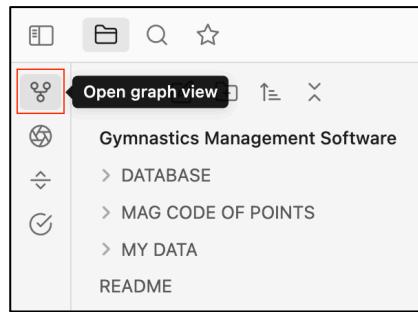


Figure 6.10: Open graph view icon (Ribbon)

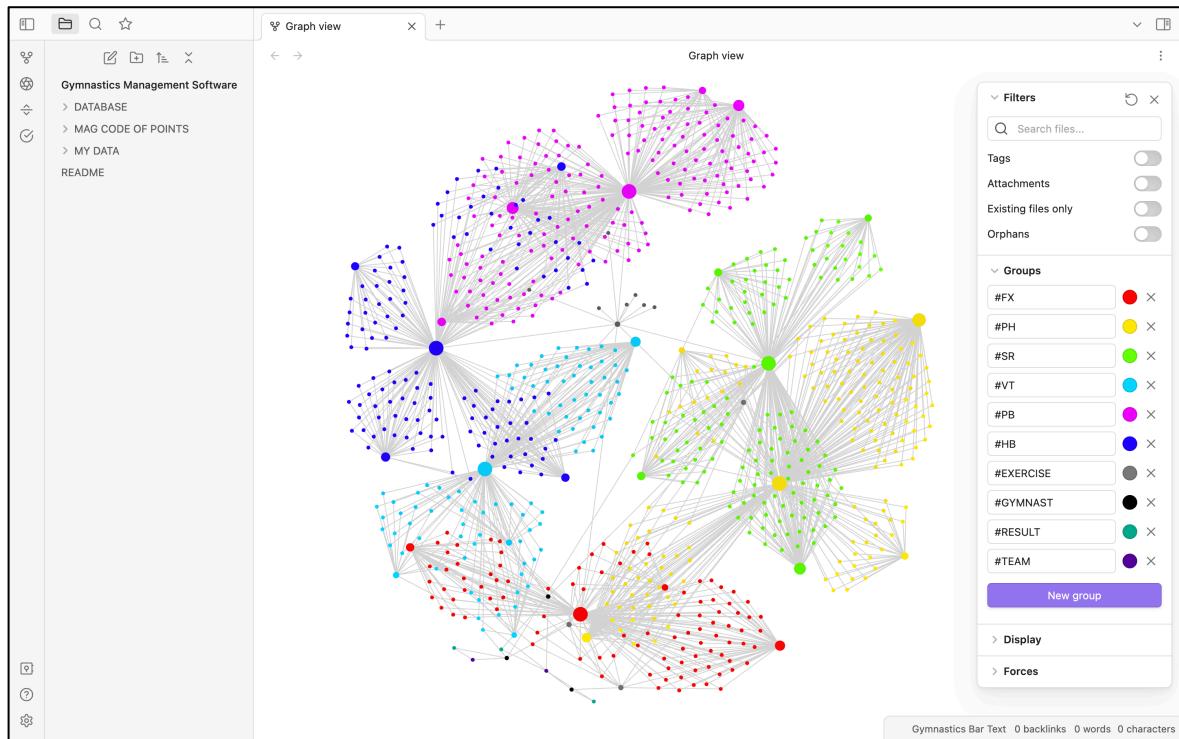


Figure 6.11: Graph view opened

6.1.2 Graph Node Positions Restoration

Click on the plugin's icon “Restore graph node positions” included in the “Ribbon” section (Figure 6.12) to reorder all nodes of the graph in accordance with graph’s clusters (Figure 6.13).

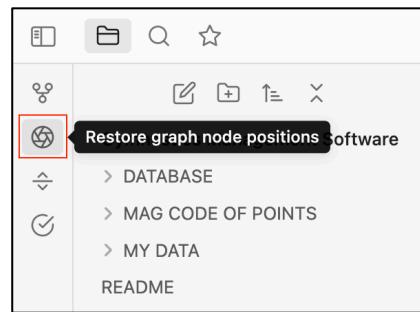


Figure 6.12: Restore graph node positions icon (Ribbon)

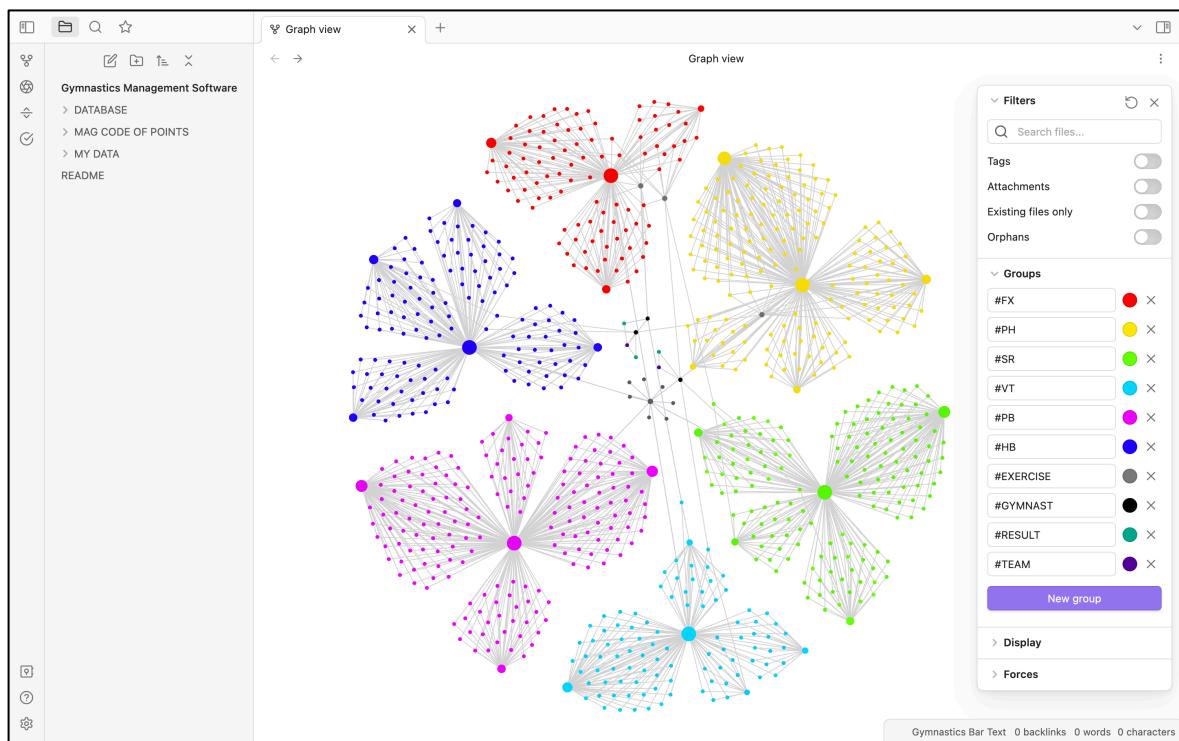


Figure 6.13: Graph node positions restored

6.2 Split Down

Official Obsidian plugin that gives the possibility to split the UI of the software in two parts (one above and one below). Through this feature it is possible to display two files of the software at the same time, easily working on both of them.

In particular, the user is able to update files of different user-management databases at the same time, making connections between them without move from the file opened to another.

Click on the plugin's icon “Split down” included in the “Ribbon” section (Figure 6.14) to visualize the file opened in two windows (one above and one below).

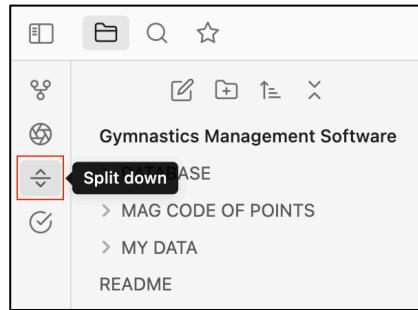


Figure 6.14: Split down icon (Ribbon)

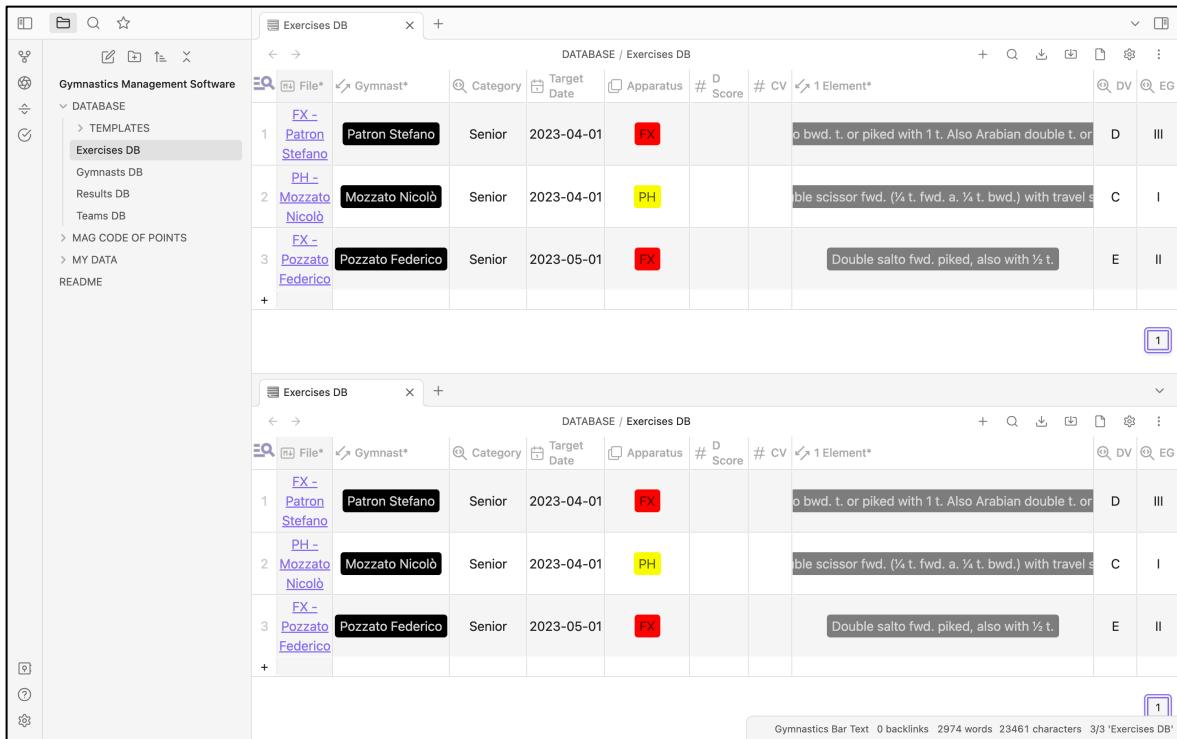


Figure 6.15: Split down notice (Exercises DB)

Note that the two windows displayed are two File Tabs (Figure 6.15), where the user can open files from the Sidebar. Above each File Tab, the user can see all the files opened and manage them closing and opening other files from the Vault of the software (Sidebar). More information about File Tab is illustrated in “User Interface (UI)” (§ 3.1).

6.2.1 Exercise Construction

The functionality of the “Split Down” plugin is extremely useful for the construction of exercises through the “Exercises DB” database (§ 5.4). “Element” property’s columns, that have a Relation property type, display a list of all gymnastics element included in the “MAG CODE OF POINTS DB” database. As previously illustrated (§ 3.2.7), this database offers a global search bar all over the files of the elements and their properties. In particular, there are predisposed filter buttons for apparatus and EG that reduce the field of consultable elements (Figure 6.16).

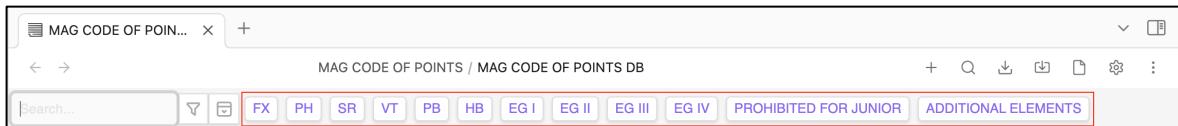


Figure 6.16: Filter buttons (MAG CODE OF POINTS DB)

When files included in the “MAG CODE OF POINTS DB” database are filtered through these predisposed buttons, the field of selectable elements in “Element” property’s columns of the “Exercises DB” database are also automatically filtered. In this way, the user can search elements that have to be performed in the exercises more easily and quickly, also reducing the probability of mistakes.

Use the “Split Down” plugin (§ 6.2) to open in the two File Tabs the “Exercises DB” and the “MAG CODE OF POINTS DB” database at the same time. Then, click on the lens icon “Global search” to display the predisposed filter buttons (Figure 6.17).

The screenshot shows the Gymnastics Management Software interface with two main windows open:

- Exercises DB**: A table view showing three entries. Column headers include File*, Gymnast*, Category, Target Date, Apparatus, D Score, CV, Element*, DV, and EG. The first entry (Row 1) is for "FX - Patron Stefano" (Senior, 2023-04-01, FX) with a note: "bwd. t. or piked with 1t. Also Arabian double t. or". The second entry (Row 2) is for "PH - Mozzato Nicolò" (Senior, 2023-04-01, PH) with a note: "ble scissor fwd. (½ t. fwd. a. ¼ t. bwd.) with travel s". The third entry (Row 3) is for "FX - Pozzato Federico" (Senior, 2023-05-01, FX) with a note: "Double salto fwd., piked, also with ½ t.". Row 3 has a plus sign (+) at the end.
- MAG CODE OF POINTS DB**: A table view showing two entries. Column headers include Name, Image, Symbol, Code, Apparatus, DV, and EG. The first entry (Row 1) is for "From hdst. lower to L-sit or strad. L-sit (2.s.)" with an image showing a person performing a sit-up, a symbol of a person sitting, and notes: "1 FX I A". The second entry (Row 2) is for "V-sit (2.s.)" with an image showing a person in a V-sit position, a symbol of a person sitting, and notes: "2 FX I B".

The left sidebar shows the software's navigation structure under "Gymnastics Management Software".

Figure 6.17: Split down to build exercises (Exercises DB, MAG CODE OF POINTS DB)

Click on a filter button to reduce the field of the elements displayed in the “MAG CODE OF POINTS DB” and also in the “Element” property’s columns (or “Dismount” column) of the “Exercises DB” (Figure 6.18) at the same time.

The screenshot shows the Gymnastics Management Software interface with two main windows open:

- Exercises DB (Top Window):** A table titled "DATABASE / Exercises DB" with columns: File*, Gymnast*, Category, Target Date, Apparatus, # D Score, # CV, and 1 Element*. It contains three rows of data:

	File*	Gymnast*	Category	Target Date	Apparatus	# D Score	# CV	1 Element*
1	FX - Patron Stefano	Patron Stefano	Senior	2023-04-01	FX			b bwd. t. or piked with 1t. Also Arabian double t. or
2	PH - Mozzato Nicolo	Mozzato Nicolo	Senior	2023-04-01	PH			ble scissor fwd. (¼ t. fwd. a. ¼ t. bwd.) with travel s
3	FX - Pozzato Federico	Pozzato Federico	Senior	2023-05-01	FX			Double salto fwd. piked, also with ½ t. x
- MAG CODE OF POINTS DB (Bottom Window):** A table titled "MAG CODE OF POINTS / MAG CODE OF POINTS DB" with columns: Name, Image, and Symbol. It contains two rows of data:

Name	Image	Symbol
double		UU
Double salto fwd. piked, also with ½ t.		UV

A context menu is open over the third row of the Exercises DB table, listing various options for the exercise element. The bottom status bar shows: Gymnastics Bar Text, 0 backlinks, 2974 words, 23461 characters, and 3/3 'Exercises DB'.

Figure 6.18: Split down and filter Element column (Exercises DB, MAG CODE OF POINTS DB)

Note that the color of the predisposed filter buttons is the same of the selections of apparatus abbreviations displayed in the “Apparatus” property’s column, in order to easily recognize the apparatus where the exercise is performed.

The screenshot shows the Gymnastics Management Software interface with two main windows open:

- Gymnasts DB**: This window displays a table of gymnasts with their names and scores. The first row is Mozzato Nicolo with a score of 22. The second row is Patron Stefano with a score of 22. The third row is Pozzato Federico with a score of 23. The "Vaults" and "Target Elements" columns are visible, showing various vault names.
- MAG CODE OF POINTS**: This window displays a table of vaults with their names and scores. The first row is "Double Tsukahara with 1 twist." with a score of 314. The second row is "Handsprint sw. w. 1/4 t. or Tsukahara str. w. 2 t." with a score of 315. The "Image" column shows small diagrams of the vaults.

The left sidebar contains a navigation tree with categories like DATABASE, MAG CODE OF POINTS, and MY DATA. The "Gymnasts DB" category is currently selected.

Figure 6.19: Split down and filter Vaults and Target Elements columns (Gymnasts DB, MAG CODE OF POINTS DB)

Note that this functionality works also with “Vaults” and “Target Elements” property’s columns of the “Gymnasts DB” database (§ 5.1), because they are also connected to the “MAG CODE OF POINTS DB” database (Figure 6.19).

6.3 Gymnastics Plugin

Obsidian plugin developed in order to support coaches and offer them an additional tool in order to analyze exercises and combinations between the elements performed by the athletes. In particular, this plugin (Figure 6.20) extremely improves the activity of construction of exercises (§ 6.2.1), offering a powerful tool for checking and calculating the difficulty of the exercises saved and displayed in the “Exercises DB” database.

The algorithm included in this plugin checks the correct composition of exercises and combinations of the elements analyzed, in accordance with the rules established by the Code of Points, then reporting a notice of all errors made during the construction of the exercise.

If no errors are noticed, the algorithm calculates the Difficulty Score (D Score) of the exercise, its Connection Values (CV) and possible Neutral Deductions (ND) of composition (anyway noticed with a warning).

Finally, D Score and CV displayed are automatically included in the Metadata (YAML) of the file of the exercise analyzed. These values are also updated in the “Exercises DB” and reported in the “D Score” and “CV” property’s columns of this database.

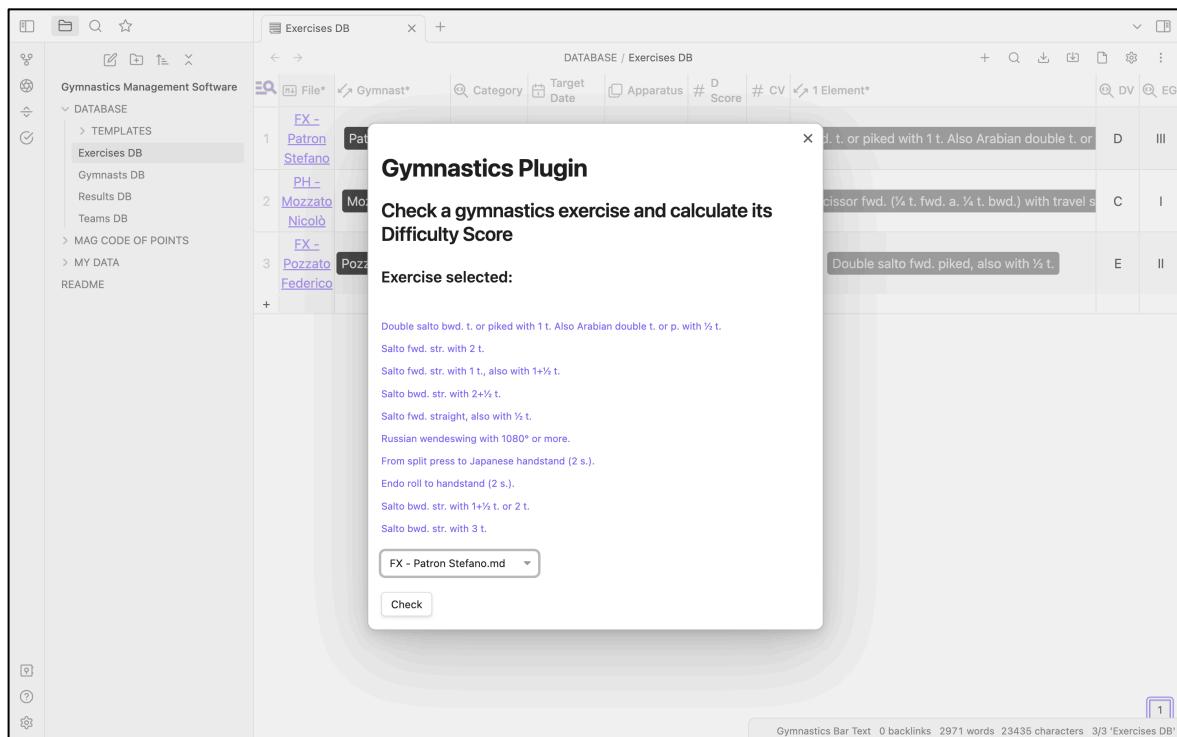


Figure 6.20: Gymnastics Plugin

6.3.1 Exercise Check

Click on the plugin's icon “Check a gymnastics exercise” included in the “Ribbon” section (Figure 6.21) to visualize a preview of the exercise selected (Figure 6.22).

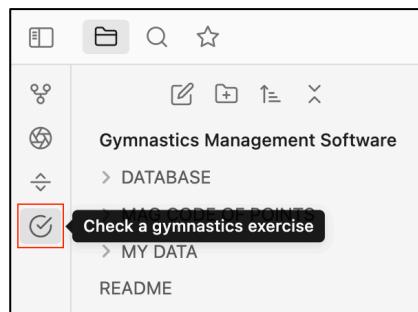


Figure 6.21: Check a gymnastics exercise icon (Ribbon)

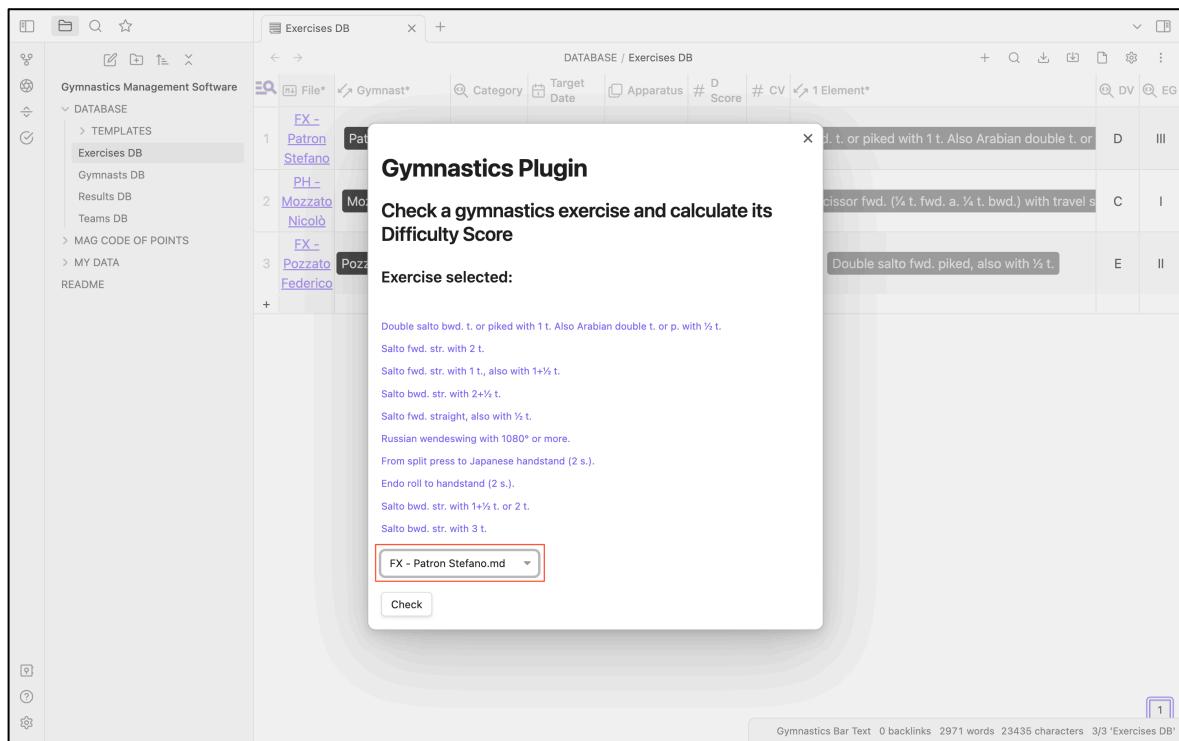


Figure 6.22: Exercise selected (Gymnastics Plugin)

Click on the drop-down menu to visualize the list of the selectable files of exercises (Figure 6.23).

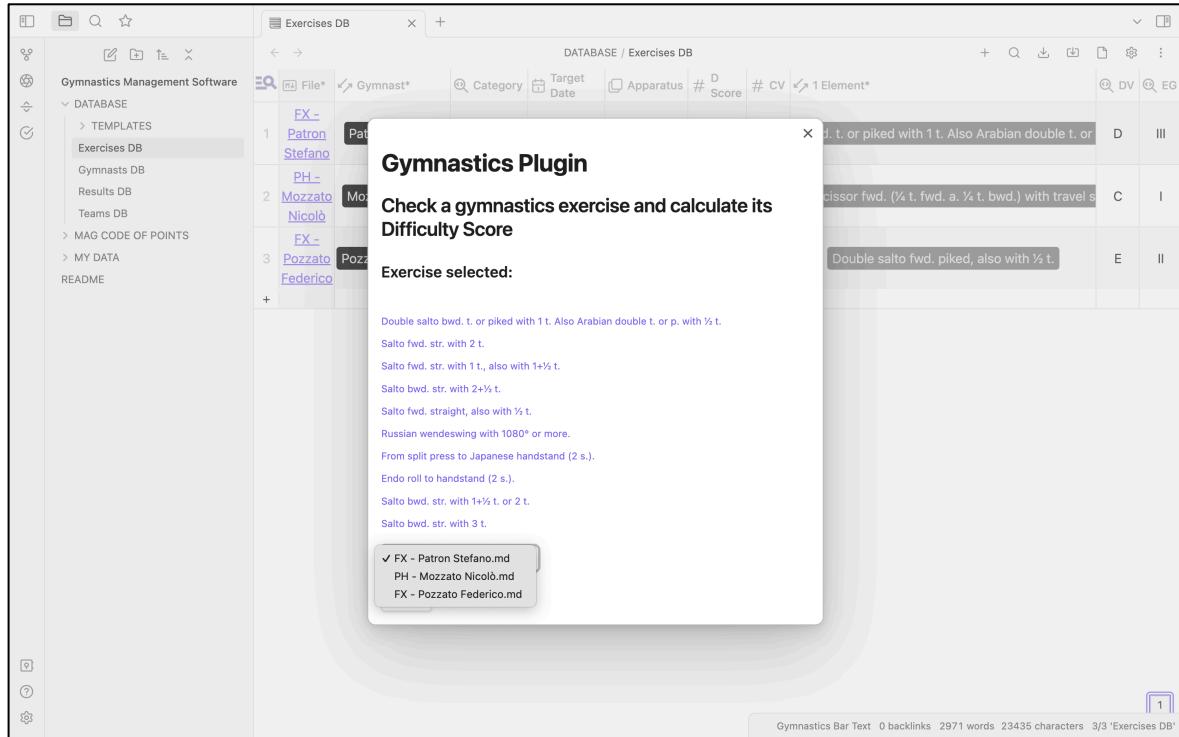


Figure 6.23: Drop-down menu (Gymnastics Plugin)

Note that all selectable files displayed in the drop-down menu are the same files of exercises built through the “Exercises DB” and automatically saved in the “MY DATA/My Exercises” folder (§ 3.4).

Choose a file of a gymnastics exercise (Figure 6.24) and click on “Check” button to check its composition (Figure 6.25).

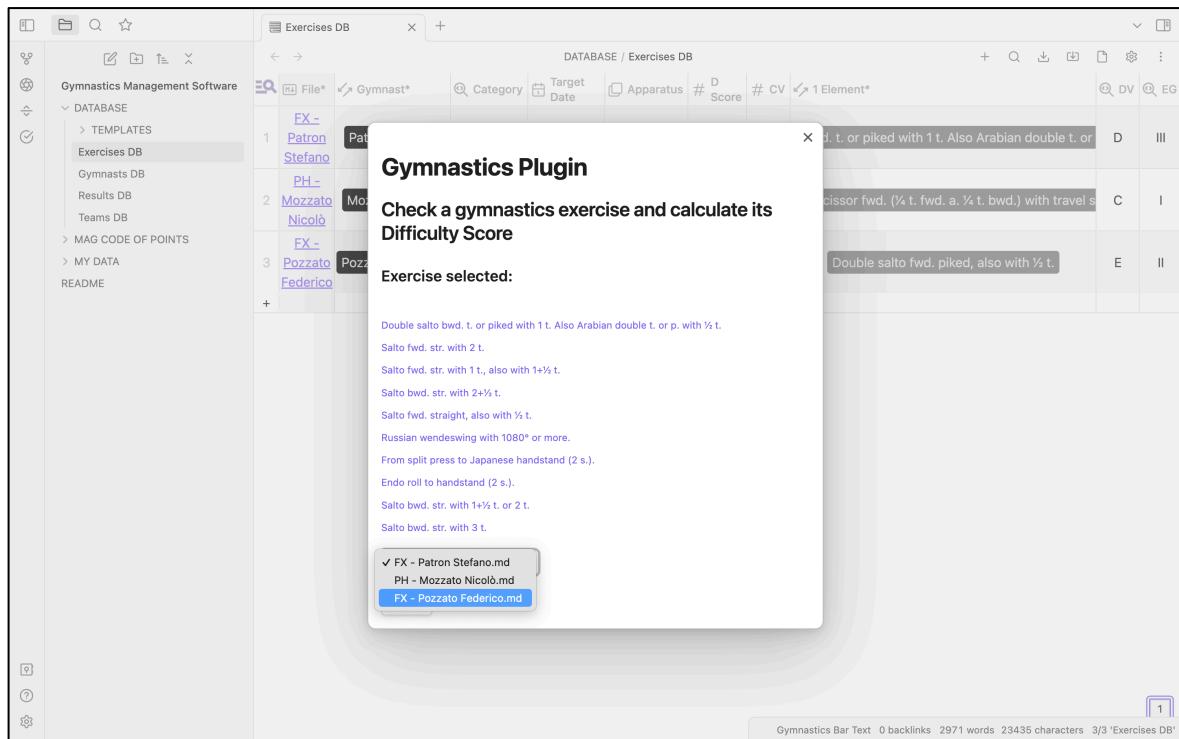


Figure 6.24: Exercises selectable (Gymnastics Plugin)

LEVERAGE 1.0.0 User Guide - © Patron Stefano

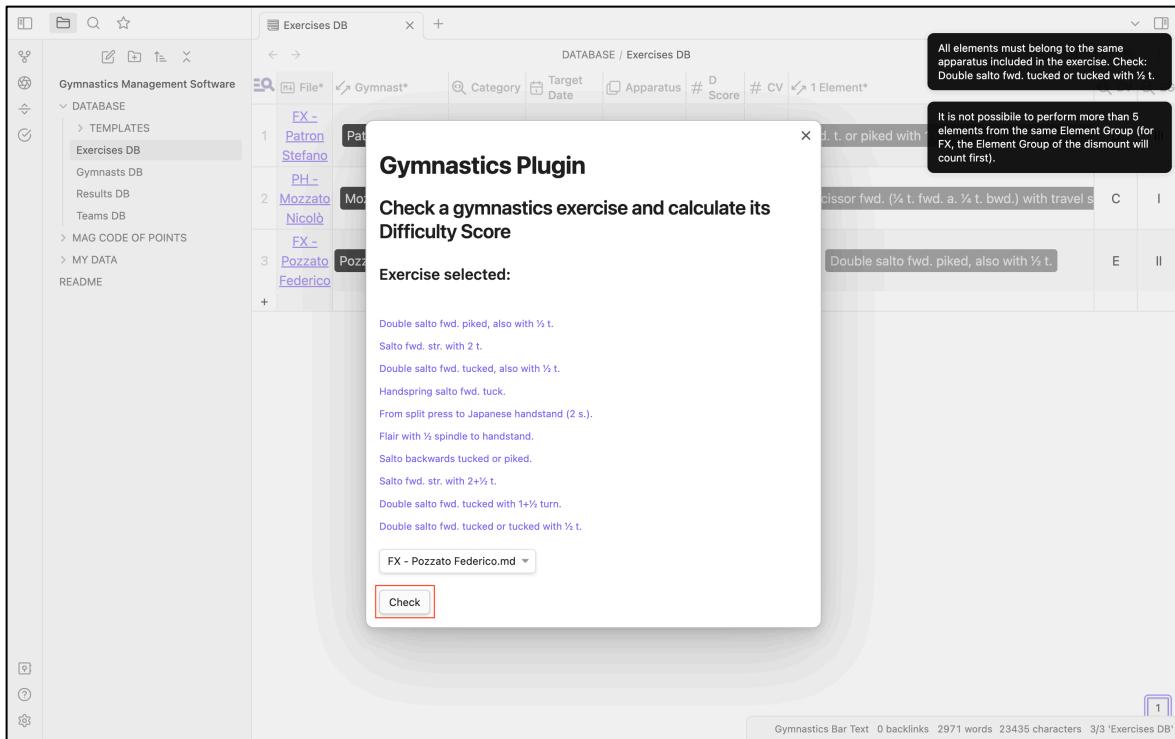


Figure 6.25: Exercise checked (Gymnastics Plugin)

If the exercise is not correct, a notice is displayed to report the composition errors committed in the exercise analyzed (Figure 6.26).

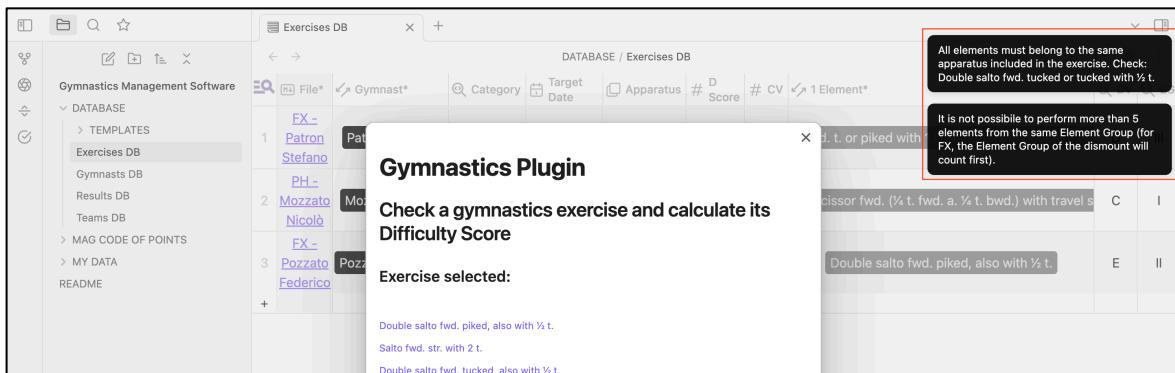


Figure 6.26: Not correct exercise notice (Gymnastics Plugin)

If the exercise is correct, a notice of correct composition is displayed and the D Score of the exercise is calculated (Figure 6.27).

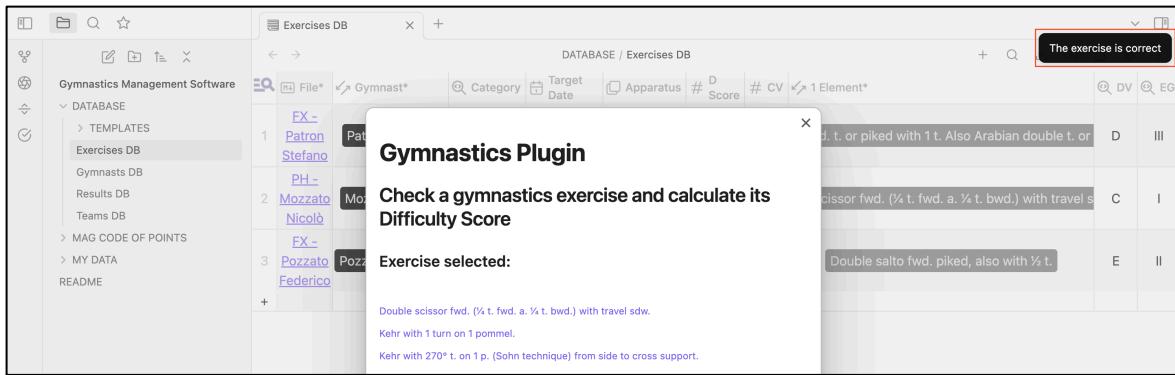


Figure 6.27: Correct exercise notice (Gymnastics Plugin)

Note that in some cases a notice of advice is displayed above the notice of correct composition (Figure 6.28), in order to help the user when the exercise analyzed includes particular rules to be respected.

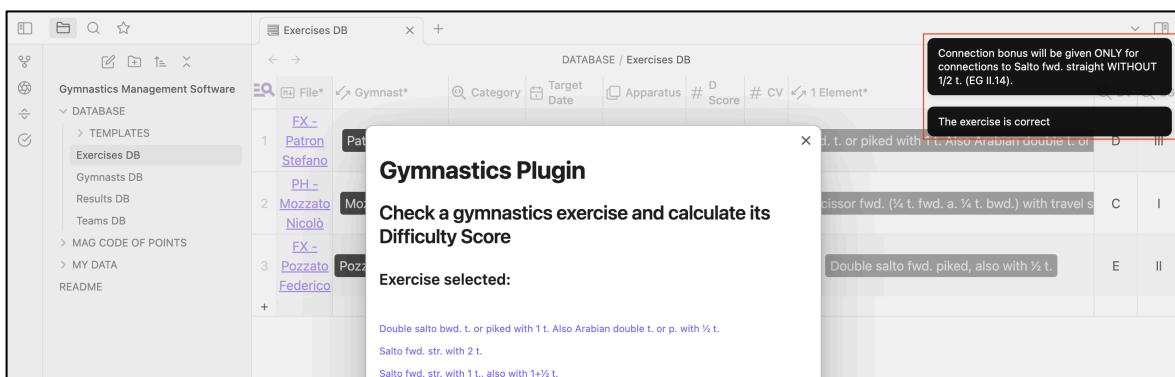


Figure 6.28: Correct exercise and advice notice (Gymnastics Plugin)

The D Score and the CV (and also possible ND of composition) of the exercise are displayed (Figure 6.29) and automatically included in the Metadata (YAML) of the file of the exercise analyzed (Figure 6.30).

LEVERAGE 1.0.0 User Guide - © Patron Stefano

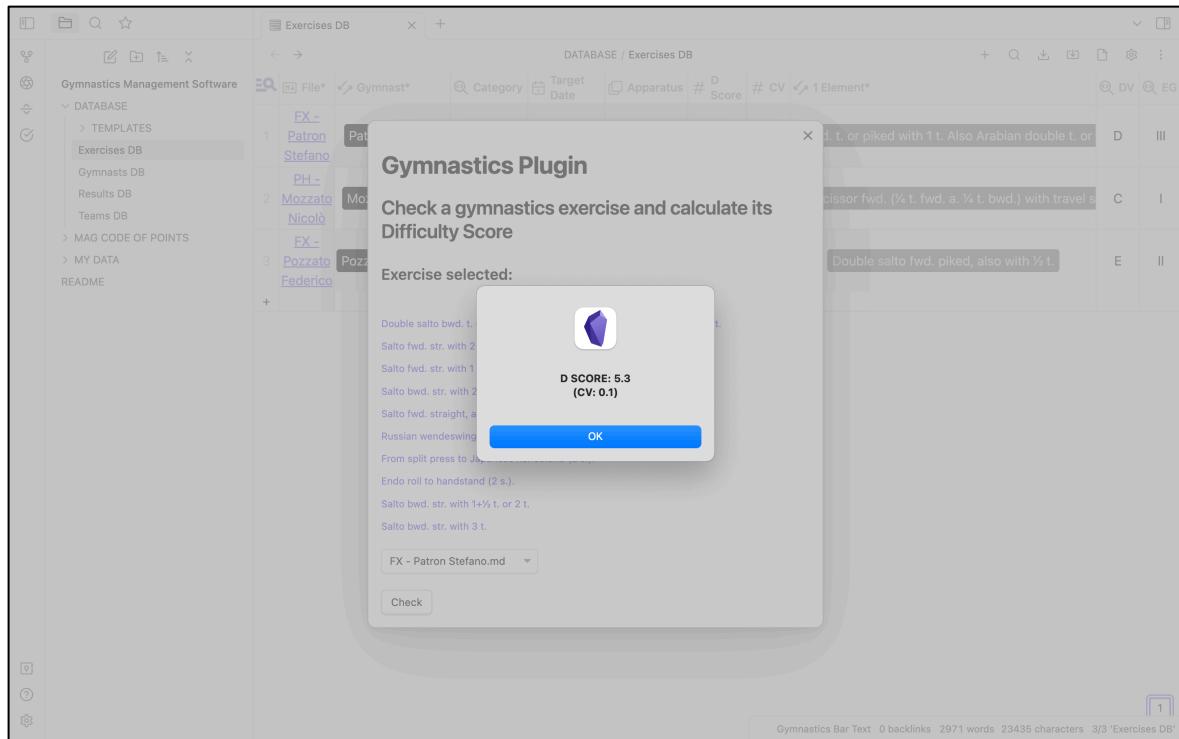


Figure 6.29: D Score and CV notice (Gymnastics Plugin)

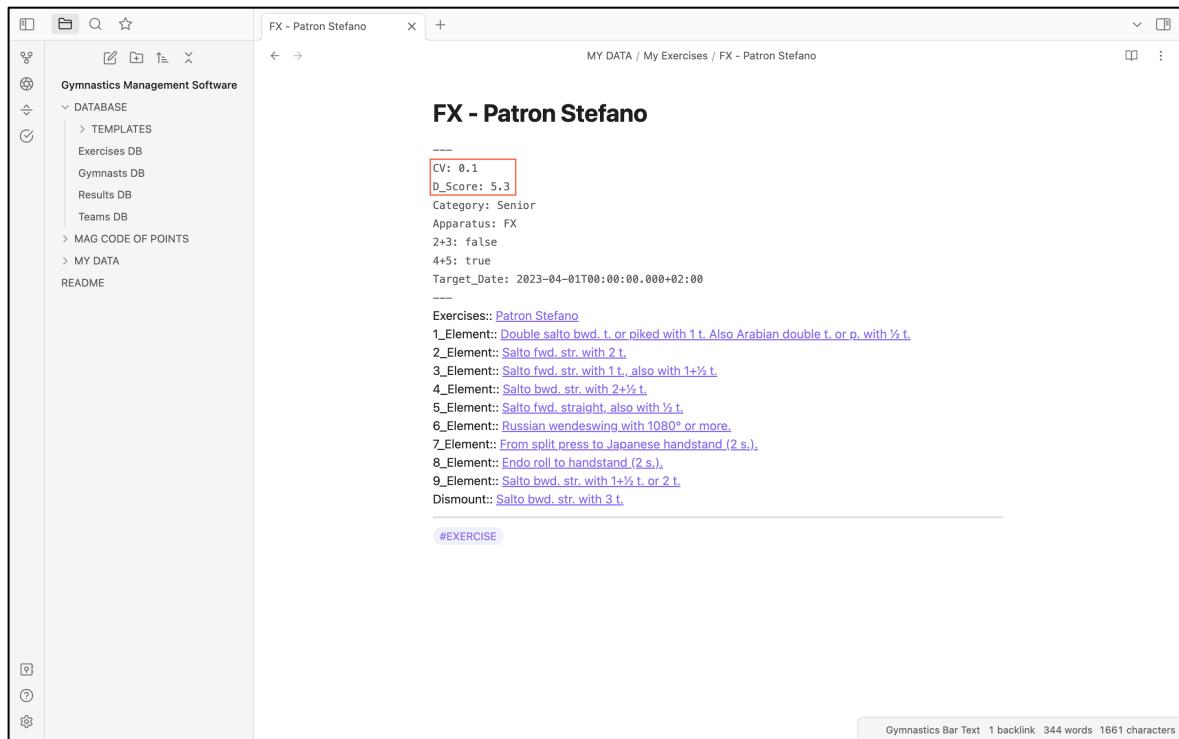
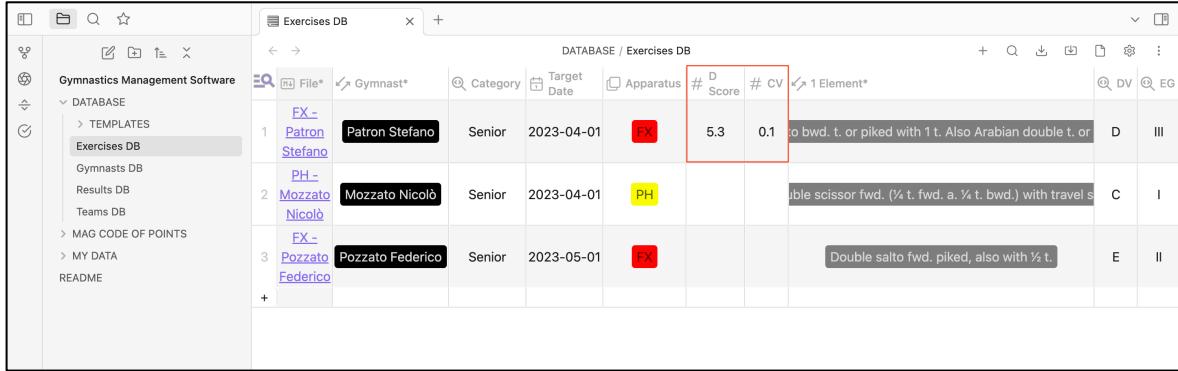


Figure 6.30: D Score and CV file's Metadata (FX – Patron Stefano)

Note that the D Score and the CV calculated are automatically displayed also in the “D Score” and “CV” property’s columns (Figure 6.31) of the “Exercises DB” database (§ 5.4).



	File*	Gymnast*	Category	Target Date	Apparatus	# D Score	# CV	1 Element*	DV	EG
1	FX - Patron Stefano	Senior	2023-04-01	FX		5.3	0.1	to bwd. t. or piked with 1t. Also Arabian double t. or	D	III
2	PH - Mozzato Nicolò Nicolò	Senior	2023-04-01	PH				Double scissor fwd. (½ t. fwd. a. ¼ t. bwd.) with travel s	C	I
3	FX - Pozzato Federico Federico	Senior	2023-05-01	FX				Double salto fwd. piked, also with ½ t.	E	II

Figure 6.31: D Score and CV columns updated (Exercises DB)

6.3.2 Hotkey

Obsidian hotkeys are fast commands that can be triggered anywhere, in order to save time when a command is frequently used.

The “Gymnastics Plugin” includes its own hotkey, that directly opens the User Guide of the plugin (Figure 6.32). The hotkey is defined as default keyboards commands:

⌘+X (CTRL+X)

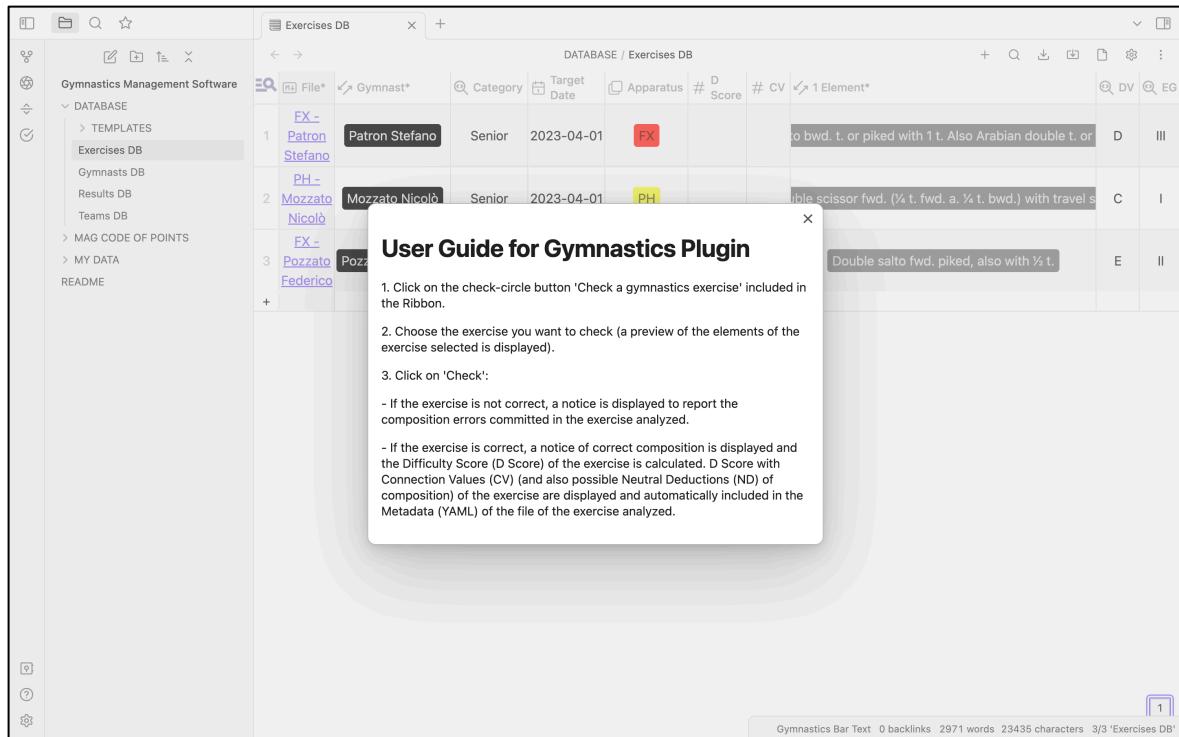


Figure 6.32: Gymnastics Plugin hotkey (User Guide for Gymnastics Plugin)

7 Future Developments

Next updates of the application are aimed at improving the functionalities that the software currently has, further simplifying the interface and the usability of the tool, in order to optimize the user experience. The support of other languages over English is another important improvement for this software, in order to promote its usage in more countries.

At the moment the software supports the men's sector of Artistic Gymnastics, but in future it is possible to introduce more disciplines of Gymnastics. Moreover, the structure of this application can also be adapted to other sports, offering to more coaches and athletes an additional tool to support their work.

The features and potentiality of the software could be expanded through the supporting of more data and statistics from sports analytics. In this way, the goal is to improve the performance of the athletes through a more focused technical and strategic scheduling.

Finally, the versatile structure implemented through this software could become extremely effective in many others fields of application. In particular, the logic organization of data through properties and connections could considerably improve the management of resources by companies, in order to optimize their results reducing wastes.

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