



JOINT INSTITUTE FOR NUCLEAR RESEARCH
Veksler and Baldin laboratory of High Energy Physics

FINAL REPORT ON THE INTEREST PROGRAMME

EqDb Manual Preparation

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Abstract

The Equipment Database (EqDb) manual preparation is a project within the INTEREST programme at the Joint Institute for Nuclear Research (JINR), Dubna, Russia. It is a project meant to enhance students' managerial and organisational skills and to make students more familiar with the EqDb database, which is an ORACLE relational database. The following report describes the whole conduct of the project. The initial status quo of the database and the manual are described in the Introduction. The Scope of work and Methods chapters outline all the steps taken throughout the whole process, from the lectures given by the supervisor about the Equipment Database, LaTeX, growing productivity and managing big projects, to the actual writing of the manual and working with the EqDb. The team made use of online collaborative tools, such as Overleaf (as an editor for LaTeX) or Google Docs. The outputs were the desired ones and, in addition to this, the students have presented some ideas in order to improve the database.

1 Introduction

Equipment Database (EqDb) is a kind of elastic online system, which is used to assist the design, assembly, installation and operation of equipment used in the NICA project [1]. Currently, EqDb is used for the MPD (Multi-Purpose Detector) detector currently being assembled at JINR (Joint Institute for Nuclear Research) in Dubna. NICA (Nuclotron-based Ion Collider fAcility) is a new accelerator complex designed at the Joint Institute for Nuclear Research (Dubna, Russia) to study properties of dense baryonic matter. After putting the NICA collider into operation JINR scientists will be able to create in the Laboratory a special state of matter in which our Universe stayed shortly after the Big Bang – the Quark-Gluon Plasma (QGP)[2]. MPD is a multi-detector, consisting of a few subdetectors, and will be positioned at one of the two interaction points of the beams at the beamline of the NICA.

The main task of EqDb is to support logistics and the construction of devices necessary for the proper operation of the MPD detector. Roles of this tool in NICA project are: components registration, documents data storage and organizational structure storage. A potential use of EqDb is also to create a calibration database for the detector. In the EqDb details regarding the prices, locations and amount of the physical equipment, documents relevant to the project, can be stored and organized. Even more, the database can keep track of every physical or juridical person that has brought any contribution to the project.

The interface of the database looks very clear and intuitive. It opens with a Home page, in which there is presented some basic information about the Equipment Database, such as version or system messages. This homepage is presented in the Figure 1. On the left there is a menu with multiple tabs that lead to the main pages of the Database. For some of them, one can find subpages, to get to a more specific place in the database. The main pages are Components, Documents and Organisational Structure. These three are shown in a tabular format, with rows for each element and well-detailed columns for every feature of the element. A big advantage of the EqDb is that, in order to keep it compact, it does not store the unnecessary data such as scans or images (BLOBs), but holds the link to a storage cloud or to a website where all these details can be looked up. However it can also store scans, should there be such a need.

The “Components” section is essential to this database, being the nucleus around which EqDb developed. Its name is self-explanatory, as it collects details about each component used in construction, assembly,

and operation of complex equipment [3]. One of the most important columns from the Components is the Part Id, which summarizes the most important data about the element, being which system, is it part of and which collaboration group is responsible for it. Part Id is a unique and individual number for every Component registered at EqDb. Each row can be modified, by clicking on the pencil icon on the left.

In the *Documents* section there can be found all the invoices, purchase documents, technical documentation or drawings etc. The *Organisational Structure* tab shows all the people involved in the project and the role they play, but also links each of them to the institution and location they belong to.

The *Metadata* and *Help* sections come in very handy when one needs a concise definition and some examples about the most used terms in the database.

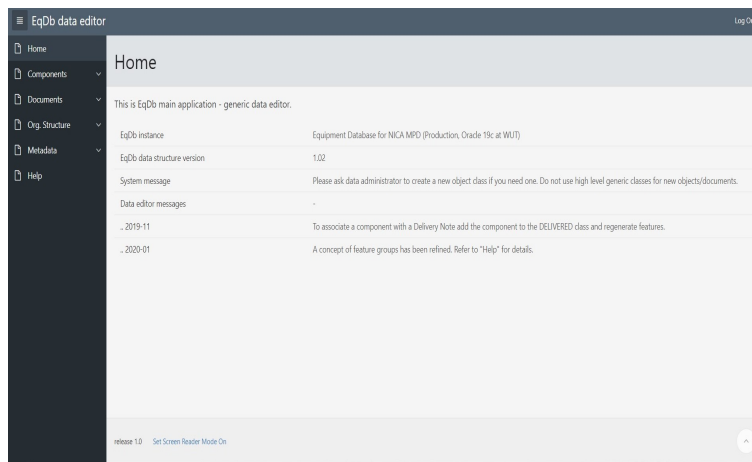


Figure 1: The homepage of the EqDb.

2 Project goals

The main goal of the project is getting students to know more about the Equipment Database, how it works, the way it was created and how to optimize it. Not only does this allow them, as future scientists, to have a broader vision about the amount of work that has been put in creating such a structure, but also makes them more aware of all the organizational and administrative work that is required for such a big project like NICA. Studying the structure of EqDb leads us to another important goal, that is creating a user manual. A user's manual is mandatory for

such a complex tool as the Equipment Database, because it facilitates the experience while using the software and clear instructions prevent mistakes and errors from happening. Along with the study of the EqDb for the NICA project, the students will also test the base as a user and see what parts can be improved and/or implemented. Should this be the case, a description of the additional parts should be created as well.

The last, but not least, goal of the project was providing students with knowledge about managing big scientific (but not only) projects and delivering presentations professionally.

3 Scope of work

EqDb manual preparation is a project meant to finish and establish a user manual for the Equipment Database in the NICA project. The practice extended on a 6-week-period of time, using Google Meet as a platform for virtual meetings. Email and Messenger were also used for written communication. All the materials regarding the project were saved on a drive, which could be accessed by every member of the team.

The following timeline shows each step taken in order to get closer to finishing up the manual.

- The first task was to get acquainted with the EqDb by adding one's personal data to the EqDb, such as title, contact, university name and address.
- The next step was checking part identifiers for some components to see if the information presented by the supervisor was well true. If it was not correct, the team was tasked with changing the data to correct.
- After studying and using the Equipment Database for tests, the students had to complete the already-existing manual, and also to bring in new ideas for the database development.
- Along the practice weeks, the supervisor provided the team with a series of lectures about database implementations for the NICA project and introduced the team to effective and professional interpersonal communication methods. There was also an introduction of the students to the agile method of managing a project, suitable for the majority of projects. The tools for project management, time management, graphics creation and others were presented allowing students to learn to work more efficiently.

4 Methods

As the Equipment Database is such a complex tool, the methods used while working on this project were very diverse. They spread on multiple levels, such as communication, managing and content creation. Working remotely has added a certain degree of flexibility and made things easier in a way, but more challenging on the other hand. The virtual meetings of the team were held weekly using the platform Google Meet. The team has also kept in touch between meetings through written communication, using Facebook Messenger and email. This has been an essential part of the project, because the students were given lectures that helped them understand how the EqDb works and what it is like to work on and manage a major project.

Team had an agile approach to this project, constantly re-evaluating the needs and requirements of both sides. Group tried to work smartly, and to have specific, measurable and achievable goals, that could fit well in the time-frame and into team schedules. The agile method was actually presented by supervisor during one of the lectures and implemented along the way. Besides this, other tools such as online apps were used to make the collaboration between the students more efficient.

Working on the manual and trying to improve the database were both collaborative and independent to some extent, in a sense that even if the tasks were assigned individually and each had their own contribution, the final result was a sum of all the brainstormed ideas, combining their skills and using one's strengths to combat the other's weaknesses. The user manual for the Equipment Database was written using Overleaf as collaborative cloud-based LaTeX editor, very useful for the remote way that the project was executed. The team has not started from the very beginning, for there was an already-existing manual, that needed to be completed with some parts. In order to do that, a few preliminary assignments were given to the team in order to get more acquainted with the database and to be able to accurately describe the actions that needed to be described in the manual. Not only have those tasks helped them get a better idea of how such a complex database works, but have also made visible the aspects that needed improvement or features that needed to be added. Some of the ideas were modeled as schemes in the *draw.io* app. The best ideas was presented in the figure 2 and figure 3.

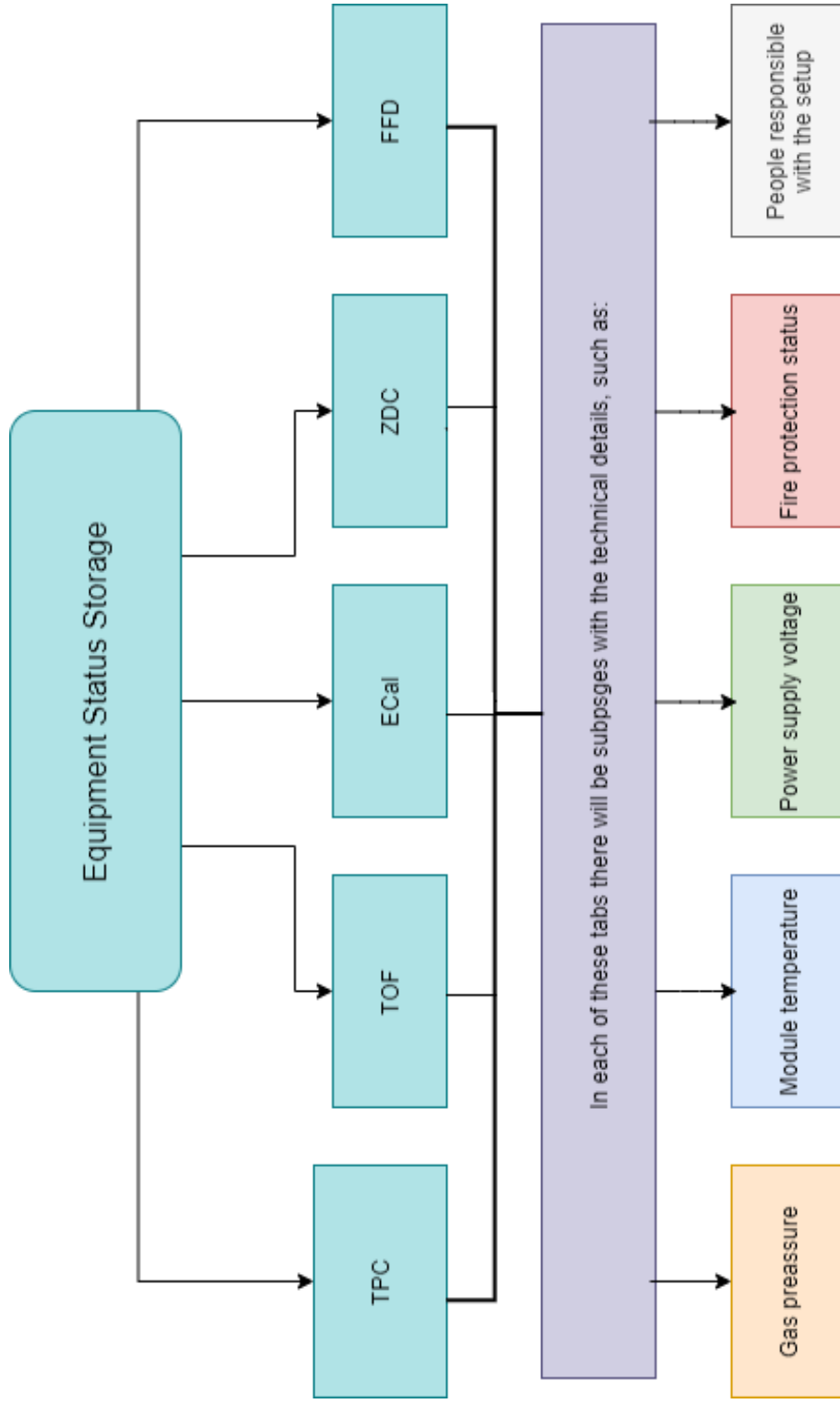


Figure 2: Adding a new section to the database, in which the details about the storage requirements and status of the components could be found.

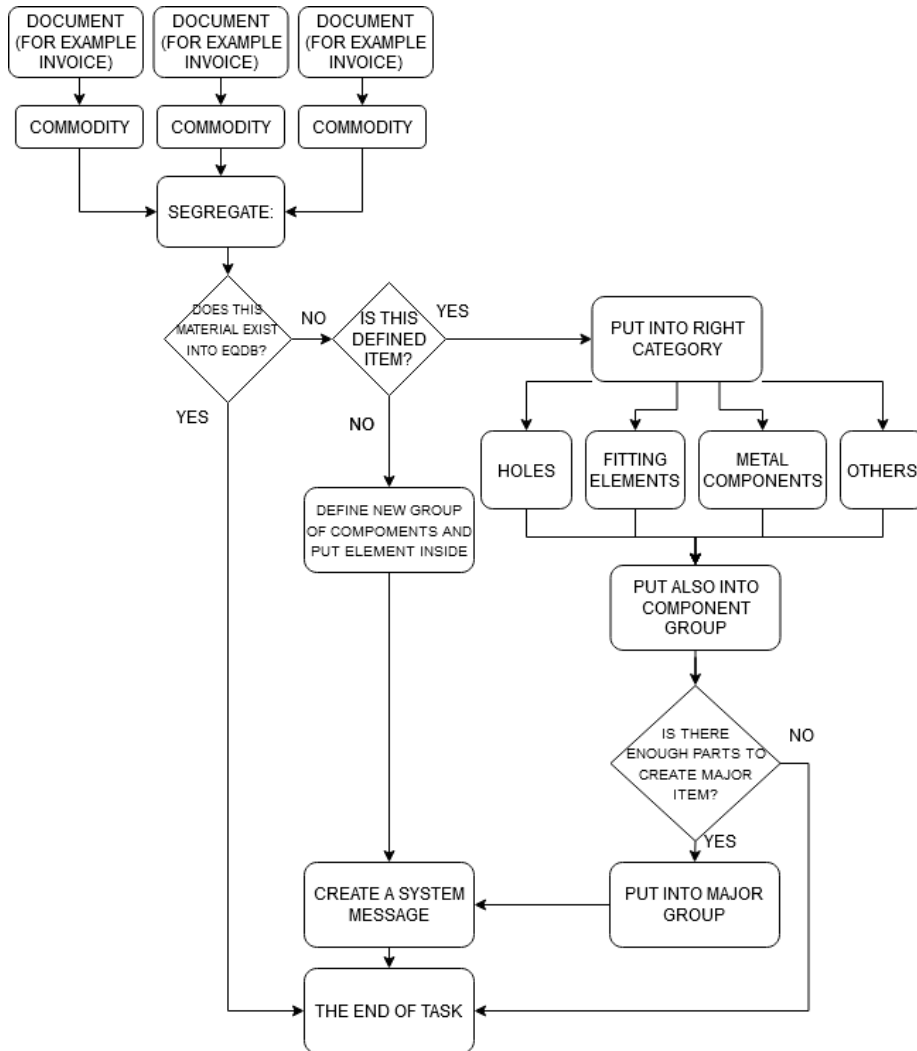


Figure 3: Visualization of commodity segregation process.

5 Results

At the end of the project was to work out a common, optimal algorithm, which is presented in Figure 4. It describes the way a component from the moment of reaching the JINR until the assignment of its location in EqDb. The algorithm covers the entire process of creating documentation, location and all necessary data that is needed to place the component in the Equipment Database. It distinguishes which of the processes are automated and which should can performed manually.

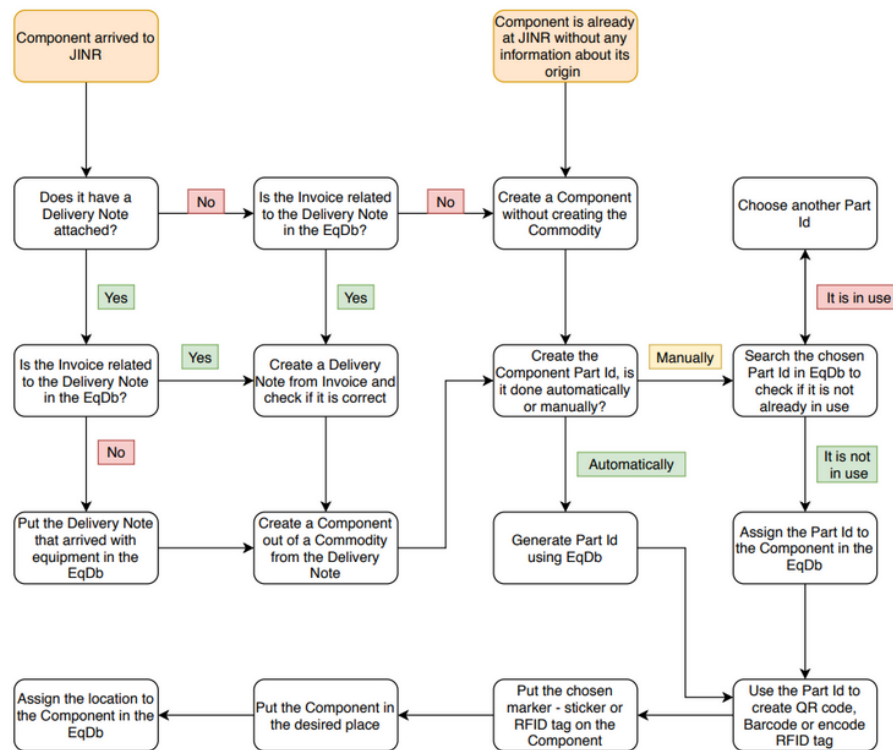


Figure 4: New component procedure.

An additional result of the work carried out at the Interest was the introduction of changes to the EqDb user Guide, consisting in describing the method of adding new locations to the database. This makes this manual even more helpful and allows every user to better understand working with EqDb.

Participation in the projects has also resulted in the development of the soft skills of the students. The team has learned how to pro-

professionally present themselves and their work, how to properly contact collaborators, how to effectively manage their time and manage various types of projects. The group has also learned how to use various software to help create all kinds of graphic and visual materials.

6 Conclusions

It was proven that participation in Interest significantly influenced the development of students abilities. By participating in the series of lectures, every member of Interest developed their communication and presentation skills, learned effective team management and the agile method of managing big projects. The program participants have greatly expanded their knowledge of Equipment Databases. They learned how to move around the database efficiently, search for the necessary data and modify them. A lot of improvements have been introduced, allowing the use of EqDb for large projects, such as NICA. Students also had to complete and optimize the already-existing manual.

Future development is needed to make the system even more intuitive and fool-proof. It is also worth creating a more modern interface. The EqDb home page should be made much more readable. It may also be helpful to place sample photos of both materials and employees from the database. It is also a good idea to automate the process of downloading data from the documents provided and classifying items directly into the appropriate structure. The *Help* section should also be expanded. The created manual could come in use in order to expand the Help section.

7 Acknowledgments

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References

- [1] <https://www.ia.pw.edu.pl/pol/Projekty/Prezentacja-wybranych-projektow/EqDb> [accessed 20.10.2020]
- [2] <https://nica.jinr.ru/> [accessed 19.10.2020]
- [3] M.Peryt, T. Traczyk, *Equipment Database Model*