Specialist munitions software and database
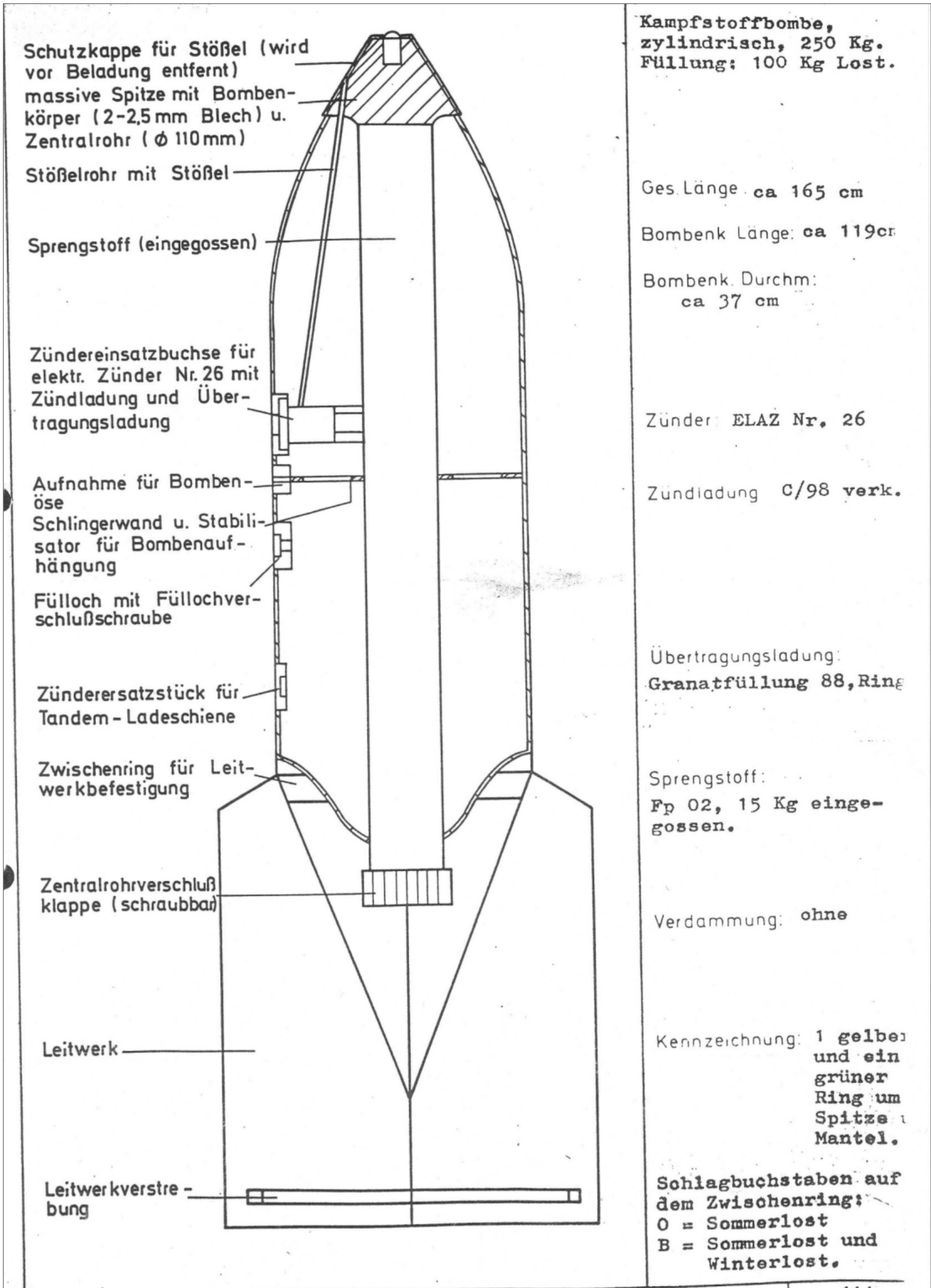
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[1]Clausthal University of Technology

[2]Dr. Koehler GmbH

The Baltic Sea contains 50000 tons of dumped chemical warfare agents (CWA) and more than 200000 tons of conventional munitions originating from the World Wars I and II. The Clausthal University of Technology has created a novel munition system in collaboration with Dr. Koehler GmbH, which allows to insert and manage complex munition types intuitively.

With the variety of the different dumped munition, the focus was on chemical munitions and the relevant dumped munition types. The detailed information about the munition includes parameters as length and diameter, case thickness, material, type of fuse and explosive, weight, chemical agent (such as Sulphur Mustard, Clark, Tabun, Phosgene). The parameters are important for the assessment of the risk, for the estimation of corrosion as well as the identification of the munition. Not only the munition itself but also some of the substances used in the munition pose a risk to the environment, to the food chain and to humans who are exposed to them. The main basis for the entered data was the research of internal archives with ammunition data from different sources.

The munition system is based on the open-source PHP web framework *Laravel*, which enables flexible development and maintenance. This allows existing munition types to be easily expanded or newly developed. Munition experts can use the web user interface to input, retrieve or update the munition data in a convenient way. The system provides a *munitions database*, which stores detailed information of dumped munition in a secure environment. The corresponding relational data model gives the possibility to process the data efficiently. Relevant munition data can be searched by different munition parameters. The munition data can easily be consumed via a REST-API and integrated into other systems such as *DAIMON Decision Support System for marine munitions (DSS)*-and may also be used for identification or as a knowledge base.

User Interface of Munition System
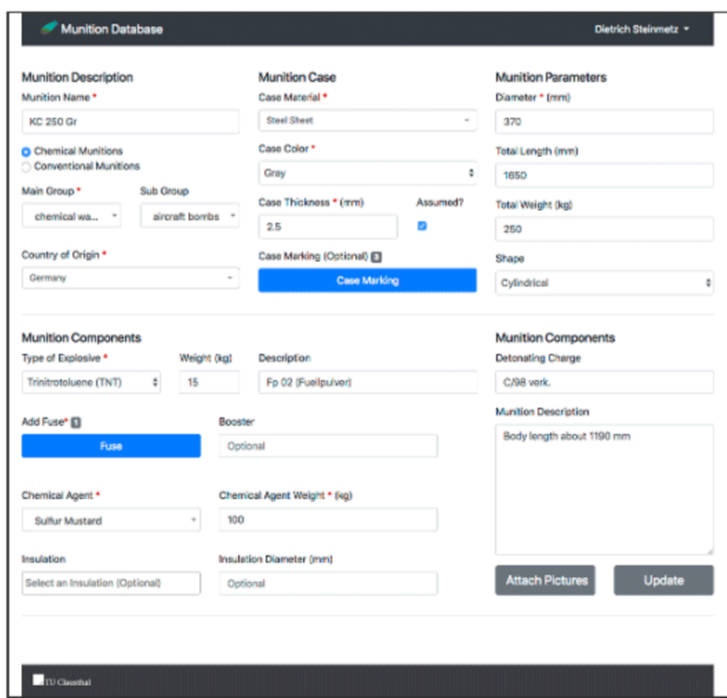
Input and Manage Munition Data

Munition Experts

https

Munition System
Laravel-Framework 5.5.*

Secure Environment

User-Authentication (email; password)

Redis Cache

Munition Database

{daily backups}

Backup

REST-Documentation (Lumen Swagger)

REST-API (Lumen)

DAIMON DSS

https
{JWT, JSON}

TU Clausthal Server
https://mdb.in.tu-clausthal.de
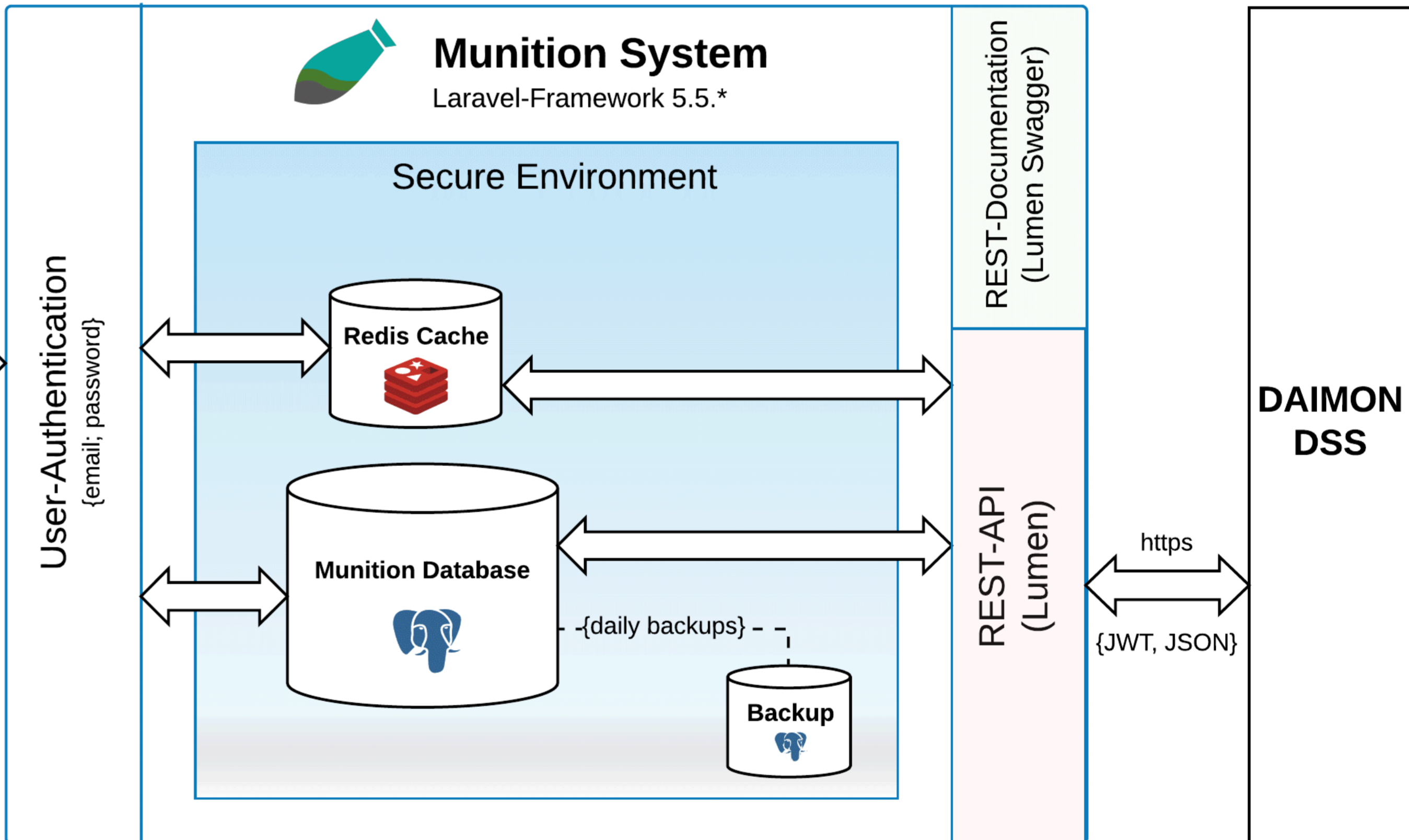
Initial Situation

- **Complex Munition Domain**
- **Many Exceptions**
- **Missing Information**
- **Non-Relevant Information**
- **Ambiguous Requirements**

Technologies and Frameworks

- **PostgreSQL for Database**
- **Laravel-framework: 5.5.***
- **Laravel-lumen-framework: 5.5.***
- **PHP 7.0, HTML, CSS, JavaScript**
- **Redis Database for Cache**

Overview of Outcomes

- **User and System Requirements**
- **User Interface for Data Producer**
- **Database Model**
- **Software Architecture**
- **REST API for Data Consumers**
- **Documentation and Testing**