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A New Database for the "Documentation of Objects in Jordanian Archaeological Museums" (DOJAM)

Introduction

Due to the regional crisis and growing illicit trafficking in cultural heritage, there was a great need for a large-scale inventory of archaeological material in Jordanian museums. Therefore, a collaborative project between the German Protestant Institute of Archaeology in the Holy Land (GPIA) and the Department of Antiquities of Jordan (DoA) was established in January 2017. It is financed by the German Gerda Henkel Foundation, whose main objective is to support the historical humanities, archaeology, the history of art, and other disciplines with a historical component. The project is entitled "DOJAM—Documentation of Objects in the Jordanian Archaeological Museums." The aim of this four-year project is the protection and management of archaeological objects stored or displayed in DoA museums, which is compatible with the 2014–2018 DoA strategy, with the focus on the Jordan Archaeological Museum (JAM) at the Amman citadel as a pilot project.

In February 2017, a Memorandum of Understanding was signed by H.E. Dr. Monther Jamhawi (at that time Director General of the DoA) and Dr. Katharina Schmidt as representative of the GPIA on behalf of Prof. Dieter Vieweger, Director General of the GPIA and Chief of the German DOJAM project's team. Dr. Jutta Häser has been designated as the local project manager, Bernard Beitz as software engineer, Dr. Hashem Khries as project assistant, and Ziad Aziz as conservator. Samia Khouri, Director of Museums and Awareness, as well as H.E. Yazed Elayan (Director General of the DoA since autumn 2019) are responsible for the project on the Jordanian side.

Project Aims

The Jordan Archaeological Museum on the Amman Citadel will act as a pilot model. It was previously the National Museum

Studies in the History and Archaeology of Jordan XIV:
Culture in Crisis: Flows of Peoples, Artifacts, and Ideas
Amman: Department of Antiquities, 2022

from the 1950's until 2013 when the Jordan Museum opened. It is particularly suitable for a pilot project because it contains a large collection of objects: there are approximately 1,500 finds on display and more than 8,000 objects in the storage rooms. Furthermore, the collection encompasses a diversity of archaeological objects, such as pottery vessels, worked stone with either inscriptions and/or decorative elements, flint tools, glass vessels as well as metal objects. The objects range in date from the Palaeolithic to the Ottoman period. Therefore, it provides examples for a wide array of entries for various archaeological objects in Jordan.

The objectives of the project are manifold. They comprise three spheres of engagement:

1) the archaeological objects
2) the storage facilities
3) the museum staff

Several aims are in focus in the first sphere:

1) building up a database for the museum objects
2) registration of archaeological objects
3) photographing of each object
4) 3D-digitization of high priority objects
5) conservation of endangered archaeological objects

The second sphere is dealing with the storage and lab facilities in the JAM:

1) renovation of the four storage rooms in the lower part of the museum
2) equipment of the storage rooms
3) management of the storage facilities
4) establishment of a risk-preparedness plan

The third sphere is focused on the training of the DoA's staff:

1) handling of archaeological objects
2) basic cleaning of archaeological objects
3) packing and storing of archaeological objects
4) inventory of archaeological objects
5) photographing of archaeological objects
6) 3D-digitization of archaeological objects

The DOJAM Database

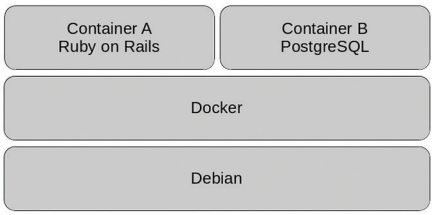
The focus of this paper is a short presentation of the new database which has been built up for the museums of the DoA. In order to provide a modern way to manage information about the archaeological objects, a database application has been designed with the two key aspects, namely usability and sustainability.

To achieve long-term sustainability, only open source and well established and mature technologies have been used. Relying on open source has also the advantage of being independent of licensing, which means lower and more predictable cost in the long run. "Ruby on Rails" has been used for building up the actual database-application and "PostgreSQL" as the database management system. Both can be run on common servers, Debian stable has been chosen, which is a common choice. "Ruby on Rails," often just called "Rails" is in use since 2005 and received very good reviews for its design and the way in which it allows for a high degree of productivity. Today, other similar frameworks are common, but nevertheless "Rails" is still a highly popular framework. As "Rails" is a web-application framework, the database-application can be accessed by any modern browser, which provides a lot of flexibility and long-term

compatibility. While "PostgreSQL" differs in many ways from the better-known MySQL, it also uses tables to store data, and it is possible to use SQL to query the database. "PostgreSQL" was chosen as it is the best supported database system for "Rails." Finally, Linux is used more often for servers than for desktop PCs, Debian is a very common Linux-based system and it was chosen because it provides a highly stable platform.

As hardware and software become deprecated relatively fast, two approaches have been levered to enable long-term usage: the application is designed as a web-application, which means that it is accessed through a web browser by the user. This avoids the necessity to install any additional software on the user's computer. Additionally, the application itself is encapsulated inside of what is called a "container" that contains any needed software and thus minimizes external dependencies so that the software can be easily run on future hard- and software (Fig. 1).

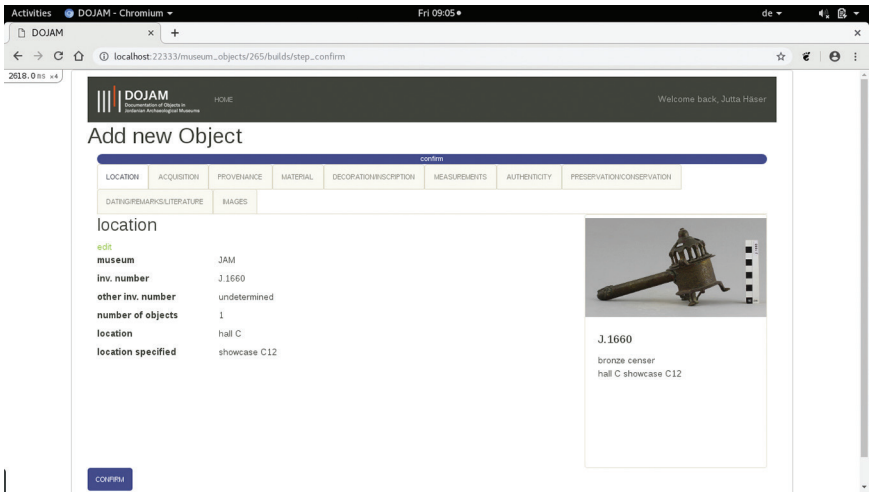
The application will be used as an administrative tool for the inventory in different archaeological museums in Jordan. Therefore, it must provide high usability. The main user group working with the database on a regular base will only have a limited scientific or technical background. To have a database that has a good technical long-term maintainability is one aspect, a second important aspect is if it is easily usable on a daily base. In order to achieve this usability, common tasks like inserting an object into the database must be kept as simple as possible. To avoid visual overloading, the data entry was split into several meaningful steps, starting with general and necessary data about the storage location up to detailed descriptions.



1. Overview of involved technologies. Docker has been used to separate the application (Container A) from the database (Container B) and from the underlying operating system (Debian).

Wherever reasonable, the user is not allowed to enter information as free text. Instead, predefined lists are presented to the user for avoiding typing errors and enabling a clearly defined terminology, which also makes querying the database much easier. As archaeological terminology tends to be very complex, this approach leads to relatively long lists, a poor overview of the possible terms, and bad usability. This is avoided by introducing smart lists. As the user inputs more and more information about the object, these data have been used to narrow possible choices in later steps. For example, as there is no armory made of glass, there is no reason to show "armor" as a possible choice for a glass object. Smart lists are made possible by an approach called "materialized path." The user starts to choose the material (*e.g.*, metal) of the object first. In a second step, he chooses the more specific material type (*e.g.*, bronze), in a third step the kind of object (*e.g.*, vessel), and at last the more specific type of an object (*e.g.*, censer). Based on this input, only sensible choices are presented to the user later. The associated paper has been published in the meantime (Beitz *et al.* 2022)

Since the database should not only be used as administrative tool for the museums but also for scientific research, a wide range of information about one object can be entered, such as production methods or bibliographical references. However, the information depth depends on the knowledge of the person who enters the data.



2. Screenshot of input mask of the DOJAM database for the step "location."

If a great number of objects has to be registered in a short period of time, it is possible to enter just the location of the object in the museum and the museum inventory number (Fig. 2). All other data can be added later.

To ensure ease of access for colleagues in the Arab world as well as for foreign researchers, the database can be used in English and Arabic.

The experience of the work in the JAM from 2017 to 2019 shows that about 40 to 50 archaeological complete objects can be entered in a relatively detailed manner to the DOJAM database by an experienced person in one day. This excludes searching and adding bibliographical references, as this process takes longer.

In 2018 and 2019, the professional photographer Johannes Kramer took photographs of the high priority objects in the JAM. In spring 2018, he trained the assistant of the project, Hashem Khries. Since then, he has photographed almost all available objects in the exhibition, *i.e.*, approximately 1,500 objects. Each object was photographed from several sides. All photographs are stored as raw- and jpg-files. Tiff-files can be generated from the raw files. At least one photograph per object has been entered to the database. In future, the number of photographs for each object inserted in the database depends on the server capacity.

In autumn 2019, the 3D-scanning of high-priority objects has been started in the JAM. These files can also be integrated in the database.

In 2020, the database will be installed on a server at the DoA and, from 2021 onwards, it should be used in all archaeological museums under the auspices of the DoA in Jordan.

Bibliography

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