

NARA Non-record Material Database

Supervisor: Lindsay Oakley

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Context:

Description:

This project involves developing a database for NARA's Heritage Science Research and Testing Lab. The primary goal is to organize and manage the lab's collection of non-record materials, which includes deaccessioned and naturally aged items, treatment materials, and other relevant samples. By creating a centralized and searchable database, the project aims to streamline access to these materials, facilitating better analysis, research, and decision-making in the preservation and conservation of archival holdings. This database will serve as a valuable resource for the lab's team, visiting scholars, and the broader heritage science community.

Vocabulary:

1. **Database:** A system where information (data) is stored in an organized way, making it easy to find and manage.
2. **Server-side:** The part of a website that works behind the scenes, handling information and making sure everything runs smoothly. It connects to the database to manage data and sends the right information to the client-side. This is often called the "back-end."
3. **Client-side:** The part of a website that you see and interact with, like buttons, forms, and text. It works with the server-side to show you the information you need. This is often called the "front-end."

My Contributions:

Plan Database:

I began by interviewing Lindsay Oakley to gain a clear understanding of her expectations for the database and the overall project. During our discussion, I took detailed notes, including her preference for an SQL database. Following this, I created an initial entity relationship diagram (ERD) to prototype the database structure. Over the next few weeks, I held feedback sessions with various team members from different research labs at NARA to refine and iterate on the diagram. After approximately four weeks of collaboration and revisions, I finalized the ERD, laying a solid foundation for the database design.

Create Database:

After finalizing my database diagram, I began the process of implementing it on the lab's desktop computer. At Lindsay's request, I used MySQL to host the database. I started by writing the necessary SQL `CREATE` statements to initialize six tables. To ensure everything was structured correctly, I first designed mock data in Google Sheets, allowing me to visualize how the tables would look and interact with each other. Once I had a clear understanding, I used SQL `INSERT` statements to populate the MySQL database with data. I then created relationship tables to define dependencies, ensuring that changes to one table would appropriately impact others when data was updated or deleted. Finally, I developed and tested SQL queries to search, update, and remove data from the tables. This phase of the project took approximately two weeks to complete.

Plan Website:

Having officially completed my intern project for NARA, I discussed with my supervisor, Lindsay Oakley, the idea of developing a web application to make the database easily accessible to a wide range of users, particularly those with limited technical experience in SQL. I began by selecting the technical tools and languages (the tech stack) required for the website development. This process involved submitting several IT tickets to get approval for these tools, which took several weeks to finalize. While awaiting approval, I started working on a basic prototype of the website features using Figma. Although Figma is typically used to design an entire website, including navigation between pages, I focused on designing the key features due to time constraints.

Create Website:

With limited time remaining in my internship, I began coding the web application, focusing primarily on the server-side. During these final two weeks, I developed and implemented multiple endpoints, thoroughly testing each URL to ensure they functioned correctly. As my internship draws to a close, I am now focused on creating comprehensive documentation to guide future users in navigating and maintaining the database project.

Future Steps:**Complete Website:**

This involves finalizing the server-side application, developing the client-side interface, and periodically updating the database to ensure functionality and relevance.

Post-MVP Enhancements:

This stage focuses on integrating additional features requested by Lindsay, such as an export-to-zip file functionality.

Website Hosting:

Currently, the website is hosted locally on a NARA lab desktop. To enhance accessibility across various devices, it is crucial to find a reliable platform for external hosting.

Cloud Migration:

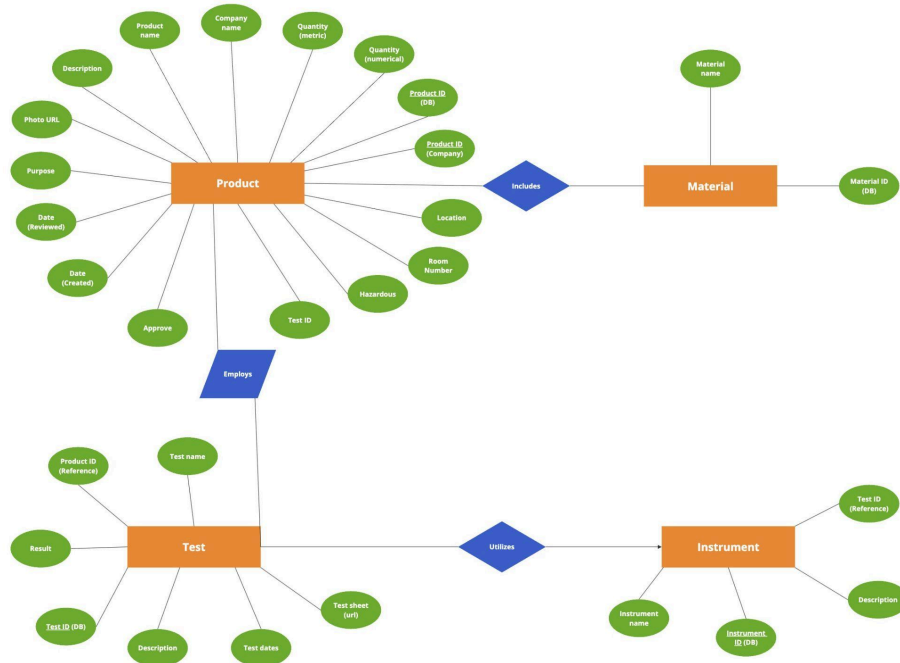
Migrating the database to the cloud is the next critical step to improve security, accessibility, and scalability.

Multi-User Support and Efficiency:

The website is currently designed for single-user access. The next phase involves enabling multi-user support, with key considerations including transaction management, concurrency control, and parallel processing.

1. **Transactions:** A transaction is like a promise that a group of actions will either all happen successfully or none at all. This helps keep data accurate and reliable, especially when something goes wrong.
2. **Concurrency:** Concurrency means that a system can do multiple things at the same time. For example, a website can handle many users browsing different pages all at once without slowing down.
3. **Parallelism:** Parallelism is when a big task is split into smaller parts, and each part is worked on at the same time by different processors. This makes the work get done faster, similar to how having more people work on a job together can get it finished quicker.

Photos:**Entity Relationship Diagram for Database:**



Tables and mock data in MySQL:

Administration Schemas

Filter objects

naradb

- Tables
 - Instrument
 - Material
 - Product
 - product_material
 - ProductMaterial
 - product_test
 - ProductTest
 - test
- Views
- Stored Procedures
- Functions
- Sys

1 • SELECT * FROM naradb.Product;

100% 30:1

Result Grid Filter Rows: Search Edit: Export/Import:

Id	Product_Name	Company_Name	Product_Id_C	Hazardous	Approve	Date_Created	Date_Reviewed	Purpose	Photo_URL	Descriptions	Quantity_Met
1	Plastic-film	Google	123nds	1	Yes	2008-12-24	2014-12-24	Example record	kjlfkaf.png	Plastic is essential for recycling	sheets
2	Nylon-fabric	Apple	987dfac	0	With	2020-09-18	2020-09-18	Exhibition		Approved with blah blah blah	in*2
3	Ice-cube	Antarctica	987dfac	0	No	2019-10-11	2019-10-11	Conservation treatment	984289ufasdfas.jpg	This is frozen water	oz
4	Cardboard-box	Microsoft	987dfac	0	No	2019-10-11	2019-10-11	Holdings maintenance		This is a literal cardboard box	box

Product 1 Apply Revert

Action Output

Time	Action	Response	Duration / Fetch Time
11 13:24:05	SELECT * FROM naradb.Product LIMIT 0, 1000	4 row(s) returned	0.0037 sec / 0.00000...

Query Completed

Prototype of search bar on Figma:

Search

Filter search by purpose...

Material type

Product name

Description










Manufacturer name

Filter for test:

--Please choose an option--

Search

3 Results

Name	Description	Manufacturer	Date(s)	
Plastic film	blah blah blah	Targét	1950, 2001	  
Cardboard box	blah blah blah	Trader Mo's	1780	  
Wheat bun	blah blah blah	Whole snack	null	  

Prototype of adding, updating, and/or deleting a product on Figma:

Product

Product name*

Manufacturer name

Product Code (Manufacturer)

Materials

Hazardous

Approve

Date Created

Date Reviewed

Purpose

Photo_URL

Quantity


Description

Limit to 1000 characters...

+ Add test

Test

Test name*



Delete

Save

Snippet of code from server-side development of website:

The screenshot shows an IDE with a project named 'Server-side_NHRL_DB'. The 'ProductController.java' file is open, showing the following code:

```

import com.NARAHeritageLab.Server_side_NHRL_DB.Entity.Product;
import com.NARAHeritageLab.Server_side_NHRL_DB.Projection.ProductProjection;
import com.NARAHeritageLab.Server_side_NHRL_DB.Service.ProductService;
import org.springframework.http.HttpStatus;
import org.springframework.http.ResponseEntity;
import org.springframework.beans.factory.annotation.Autowired;
import org.springframework.web.bind.annotation.*;

import java.util.List;

no usages & modpura *
@RestController
@RequestMapping("/api/products")
public class ProductController {
    @Autowired
    private ProductService productService;
    // Endpoint to get all products
    no usages & modpura
    @GetMapping
    public ResponseEntity<List<ProductProjection>> getAllProducts() {
        List<ProductProjection> products = productService.getAllProductsProjection();
        if (products == null || products.isEmpty()) {
            return new ResponseEntity<> (HttpStatus.NO_CONTENT); // Return 204 if no products found
        }
        return new ResponseEntity<> (products, HttpStatus.OK); // Return 200 with the list of products
    }
}

```

The bottom of the screenshot shows the 'Run' console with the following logs:

```

2024-08-05T14:12:08.162-04:00 INFO 54731 --- [Server-side_NHRL_DB] [main] c.n.s.ServerSideNHRLDBApplication : Started ServerSideNHRLDBApplication in 2.421
seconds (process running for 2.609)
2024-08-05T14:12:11.441-04:00 INFO 54731 --- [Server-side_NHRL_DB] [ionShutdownHook] j.LocalContainerEntityManagerFactoryBean : Closing JPA EntityManagerFactory for
persistence unit 'default'
2024-08-05T14:12:11.443-04:00 INFO 54731 --- [Server-side_NHRL_DB] [ionShutdownHook] com.zaxxer.hikari.HikariDataSource : HikariPool-1 - Shutdown initiated...
2024-08-05T14:12:11.447-04:00 INFO 54731 --- [Server-side_NHRL_DB] [ionShutdownHook] com.zaxxer.hikari.HikariDataSource : HikariPool-1 - Shutdown completed.
Process finished with exit code 130 (Interrupted by signal 2:SIGINT)

```

Testing URL endpoints on Postman:

The screenshot shows a Postman REST client interface. The URL is `http://localhost:8080/api/products/2` and the method is `GET`. The response is a JSON object:

```

{
  "position": "Drawer 5",
  "id": 2,
  "approve": "With",
  "purpose": "Exhibition",
  "tests": [
    {
      "id": 3,
      "testName": "Melt-test",
      "instrument": {
        "id": 1,
        "instrumentName": "Lighter"
      }
    }
  ],
  "materials": [
    {
      "id": 2,
      "materialName": "Paper",
      "products": [
        {
          "id": 1,
          "productName": "Plastic-film"
        }
      ]
    }
  ]
}

```