

# Welcome to SLAC

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# Abstract

Documentation of radioactive materials is an important responsibility handled by the staff at SLAC. They need to be able to accurately inventory and process radioactive items to ensure safe handling and disposal. Spreadsheets accomplish this on a basic level; however, the goal of this project is to create a new solution to the documentation issue. This project aims to make documenting radioactive waste easier, less prone to error, and more functional by using a web interface instead of spreadsheets. The web interface communicates with a backend database to process information and generate useful reports needed by SLAC employees. The type of information generated by the reports includes: how much waste was generated in a fiscal year? Which materials are hazardous? What is the calculated volume of a given item? These reports will help SLAC staff better understand the types of materials they have onsite and how they can be handled responsibly.

# About Me

SLAC



**Computer Science**



**Louisiana State  
University**



**From New Orleans**

# Radioactive Waste Disposal Website

Research and Development Process



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# The Task Given

SLAC manages radioactive waste materials and must document all of it which can be:

- Tedious
- Susceptible to error
- Less functional

## Example:

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
1	FAQ GUID	CategoryId	Published.Name	Published.Conditions	Components	Left	Expression	Mapping 1	Published.Con	Conditions Title									
2	53c5d750-6c6f-4e00-b2b6-7027310ad74	ec9af3c2-7987-4f62-807f-274532117be	Ваш запрос передан в соответствующий	Interaction.Data[71347ee1-528a-44c9-aabd-250e173445a0]	Classification One	a64137b0-3642-42a	D&V												
3	53c5d750-6c6f-4e00-b2b6-7027310ad74	ec9af3c2-7987-4f62-807f-274532117be	Ваш запрос передан в соответствующий	Interaction.Data[00384b6-5da1-4c07-993f-1a609976326]	Classification Two	730c43ba-ce93-42c	Escalation												
4	53c5d750-6c6f-4e00-b2b6-7027310ad74	ec9af3c2-7987-4f62-807f-274532117be	Ваш запрос передан в соответствующий	Interaction.Data[433b9f9-21ac-4a65-8865-5238a05ae20a]	Language	5d786709-6317-4b5	Russian												
5	53c5d750-6c6f-4e00-b2b6-7027310ad74	ec9af3c2-7987-4f62-807f-274532117be	Ваш запрос передан в соответствующий	Interaction.Data[62c1bc5b-ee96-432c-a6e5-cb8f93b04a0]	Sub-Topic	48e1d70-125d-43b	Non order related												
6	53c5d750-6c6f-4e00-b2b6-7027310ad74	ec9af3c2-7987-4f62-807f-274532117be	Ваш запрос передан в соответствующий	Interaction.Data[488b859-531c-4ae1-9c6b-838ce27b3b]	Topic	a07edda-628e-43c	Non order/feedback												
7	9f57acd1-156a-4584-8aa5-75353436ae521	2d1932bb-7f64-4ee3-8eeb-2dd316d70474	Ваш запрос передан в соответствующий	Interaction.Data[71347ee1-528a-44c9-aabd-250e173445a0]	Classification One	961cae44-5d88-41c	Frequently asked questions												
8	9f57acd1-156a-4584-8aa5-75353436ae521	2d1932bb-7f64-4ee3-8eeb-2dd316d70474	Ваш запрос передан в соответствующий	Interaction.Data[00384b6-5da1-4c07-993f-1a609976326]	Classification Two	730c43ba-ce93-42c	Escalation												
9	9f57acd1-156a-4584-8aa5-75353436ae521	2d1932bb-7f64-4ee3-8eeb-2dd316d70474	Ваш запрос передан в соответствующий	Interaction.Data[433b9f9-21ac-4a65-8865-5238a05ae20a]	Language	5d786709-6317-4b5	Russian												
10	9f57acd1-156a-4584-8aa5-75353436ae521	2d1932bb-7f64-4ee3-8eeb-2dd316d70474	Ваш запрос передан в соответствующий	Interaction.Data[62c1bc5b-ee96-432c-a6e5-cb8f93b04a0]	Sub-Topic	48e1d70-125d-43b	Non order related												
11	9f57acd1-156a-4584-8aa5-75353436ae521	2d1932bb-7f64-4ee3-8eeb-2dd316d70474	Ваш запрос передан в соответствующий	Interaction.Data[488b859-531c-4ae1-9c6b-838ce27b3b]	Topic	a07edda-628e-43c	Non order/feedback												
12	b0c10e2e-8b50-4360-8358-571a0c371601	ec9af3c2-7987-4f62-807f-274532117be	Ваш запрос передан в соответствующий	Interaction.Data[71347ee1-528a-44c9-aabd-250e173445a0]	Classification One	34d7b8ca-5bda-48f	I want to cancel												
13	b0c10e2e-8b50-4360-8358-571a0c371601	ec9af3c2-7987-4f62-807f-274532117be	Ваш запрос передан в соответствующий	Interaction.Data[00384b6-5da1-4c07-993f-1a609976326]	Classification Two	478b510d-17b4-46e1	How to cancel												
14	b0c10e2e-8b50-4360-8358-571a0c371601	ec9af3c2-7987-4f62-807f-274532117be	Ваш запрос передан в соответствующий	Interaction.Data[433b9f9-21ac-4a65-8865-5238a05ae20a]	Language	5d786709-6317-4b5	Russian												
15	b0c10e2e-8b50-4360-8358-571a0c371601	ec9af3c2-7987-4f62-807f-274532117be	Ваш запрос передан в соответствующий	Interaction.Data[62c1bc5b-ee96-432c-a6e5-cb8f93b04a0]	Sub-Topic	b2d2de8d-b202-4d1	Cancelling an order												
16	b0c10e2e-8b50-4360-8358-571a0c371601	ec9af3c2-7987-4f62-807f-274532117be	Ваш запрос передан в соответствующий	Interaction.Data[488b859-531c-4ae1-9c6b-838ce27b3b]	Topic	c06b263-c0e0-4d2	Order Issues												
17	1ebc707b-0357-403d-a690-75c602da7868	d8a32b52-b74e-4fca-adb2-cdd3c019605	Ваш запрос передан в соответствующий	Interaction.Data[71347ee1-528a-44c9-aabd-250e173445a0]	Classification One	782b0a3c-bf6a-414e	Live Issues												
18	1ebc707b-0357-403d-a690-75c602da7868	d8a32b52-b74e-4fca-adb2-cdd3c019605	Ваш запрос передан в соответствующий	Interaction.Data[00384b6-5da1-4c07-993f-1a609976326]	Classification Two	9d3a65e-e098-4a0	Live Issues												
19	1ebc707b-0357-403d-a690-75c602da7868	d8a32b52-b74e-4fca-adb2-cdd3c019605	Ваш запрос передан в соответствующий	Interaction.Data[433b9f9-21ac-4a65-8865-5238a05ae20a]	Language	eb5dc8f1e13-4143	French												
20	1ebc707b-0357-403d-a690-75c602da7868	d8a32b52-b74e-4fca-adb2-cdd3c019605	Ваш запрос передан в соответствующий	Interaction.Data[62c1bc5b-ee96-432c-a6e5-cb8f93b04a0]	Sub-Topic	d714e550-4223-4b1	Live Issues												
21	1ebc707b-0357-403d-a690-75c602da7868	d8a32b52-b74e-4fca-adb2-cdd3c019605	Ваш запрос передан в соответствующий	Interaction.Data[488b859-531c-4ae1-9c6b-838ce27b3b]	Topic	c1e332ca-9874-471	Live Issues												
22	0244f230-2047-43a6-a76d-099ecbcbcb12	439e9624-e6c7-47b1-a553-ea76a3c3173	Comande passéé dono problème	Interaction.Data[71347ee1-528a-44c9-aabd-250e173445a0]	Classification One	95290324-a88b-411	Tech Support												
23	0244f230-2047-43a6-a76d-099ecbcbcb12	439e9624-e6c7-47b1-a553-ea76a3c3173	Comande passéé dono problème	Interaction.Data[00384b6-5da1-4c07-993f-1a609976326]	Classification Two	c253194-d0ca-412f	Mobile												
24	0244f230-2047-43a6-a76d-099ecbcbcb12	439e9624-e6c7-47b1-a553-ea76a3c3173	Comande passéé dono problème	Interaction.Data[433b9f9-21ac-4a65-8865-5238a05ae20a]	Language	eb5dc8f1e13-4143	French												
25	0244f230-2047-43a6-a76d-099ecbcbcb12	439e9624-e6c7-47b1-a553-ea76a3c3173	Comande passéé dono problème	Interaction.Data[62c1bc5b-ee96-432c-a6e5-cb8f93b04a0]	Sub-Topic	d714e550-4223-4b1	Live Issues												
26	0244f230-2047-43a6-a76d-099ecbcbcb12	439e9624-e6c7-47b1-a553-ea76a3c3173	Comande passéé dono problème	Interaction.Data[488b859-531c-4ae1-9c6b-838ce27b3b]	Topic	d628f85c-6d8d-471f	Technical												
27	8027b064-3a10-413f-90d9-4e833d7b4b2b	7ea3accd-0b49-4101-bc0b-15407aefc584	Donnez-nous plus d'infos VVP- ID6	Interaction.Data[71347ee1-528a-44c9-aabd-250e173445a0]	Classification One	505bc4b8-16b4-4e1	ID6 V fail												
28	8027b064-3a10-413f-90d9-4e833d7b4b2b	7ea3accd-0b49-4101-bc0b-15407aefc584	Donnez-nous plus d'infos VVP- ID6	Interaction.Data[00384b6-5da1-4c07-993f-1a609976326]	Classification Two	7ea0ab93-3b5d-4e5	More info needed												
29	8027b064-3a10-413f-90d9-4e833d7b4b2b	7ea3accd-0b49-4101-bc0b-15407aefc584	Donnez-nous plus d'infos VVP- ID6	Interaction.Data[433b9f9-21ac-4a65-8865-5238a05ae20a]	Language	eb5dc8f1e13-4143	French												
30	8027b064-3a10-413f-90d9-4e833d7b4b2b	7ea3accd-0b49-4101-bc0b-15407aefc584	Donnez-nous plus d'infos VVP- ID6	Interaction.Data[62c1bc5b-ee96-432c-a6e5-cb8f93b04a0]	Sub-Topic	48e1d70-125d-43b	Non order related												
31	8027b064-3a10-413f-90d9-4e833d7b4b2b	7ea3accd-0b49-4101-bc0b-15407aefc584	Donnez-nous plus d'infos VVP- ID6	Interaction.Data[488b859-531c-4ae1-9c6b-838ce27b3b]	Topic	a07edda-628e-43c	Non order/feedback												
32	86a3a306-073a-426f-b6e3-1b6732e4a7e	23d0a6b-bec3-4a03-b2c5-97a73130371e	Donnez-nous plus d'infos VVP- ID6	Interaction.Data[71347ee1-528a-44c9-aabd-250e173445a0]	Classification One	ecd1f28-e461-4ae	Advise to keep												
33	86a3a306-073a-426f-b6e3-1b6732e4a7e	23d0a6b-bec3-4a03-b2c5-97a73130371e	Donnez-nous plus d'infos VVP- ID6	Interaction.Data[00384b6-5da1-4c07-993f-1a609976326]	Classification Two	7ea0ab93-3b5d-4e5	More info needed												

# How Can This Be Improved?

Remake the documentation process and turn it into a website that can:

- Receive information about radioactive materials
- Calculate data about items such as volume and weight
- Generate reports about items

# Development Environment

- Programming Languages - C#, HTML, JavaScript, CSS
- Database Language - MySQL
- Repository - GitHub



# Main Tables of Data

The types of data the website must handle:

1. Items – radioactive material declarations
2. Containers – comprised of items
3. Shipments – containers assigned to a shipment
4. Burial – shipments are given a final burial

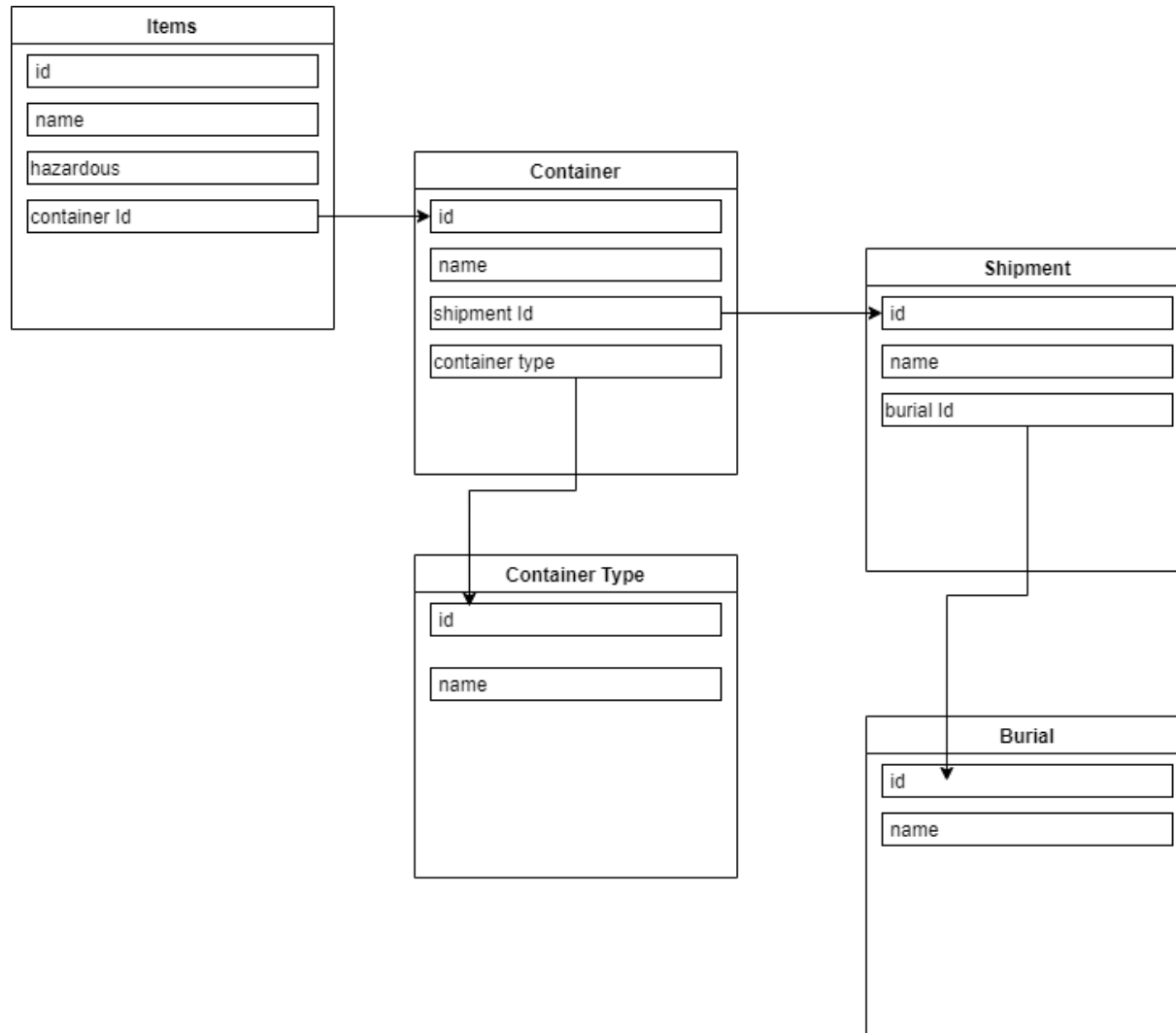
## Example:

### Radioactive Material Declaration:

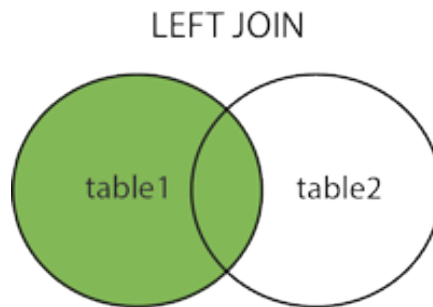
id: 3  
name: fuel cell 1  
length: 2 ft  
width: 3 ft  
height: 4 ft  
hazardous: Yes



# Database Diagram



# Left Join Example



**Container Table**

	id	name
	1	fuel container
	2	trash bin

**Items Table**

	id	name	hazardous	container_id
	1	spent fuel cell 1	Yes	1
	2	spent fuel cell 2	Yes	1
	3	trash 1	No	2

# Left Join Output

## MySQL Command:

```
SELECT * FROM container LEFT JOIN items ON container.id = items.container_id
```

Left Table

id	name
1	fuel container
2	trash bin

Right Table:

id	name	hazardous	container_id
1	spent fuel cell 1	Yes	1
2	spent fuel cell 2	Yes	1
3	trash 1	No	2

Output Joined Table:

id	name	id	name	hazardous	container_id
1	fuel container	1	spent fuel cell 1	Yes	1
1	fuel container	2	spent fuel cell 2	Yes	1
2	trash bin	3	trash 1	No	2

# Why is this Important?

MySQL is a relational database which allows the website to:

- Avoid storing duplicated data
- Make comparisons between tables of data
- Provide useful search functionality

# Website Preview

Current Progress



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Some of the current website features implemented:

- Creation forms for: Items, Containers, Shipments, Burials
- Display created data in a useful way
- Calculate information such as container capacity and item volume
- Search by specific properties
- Add attachments

# Items Dashboard



Search By Field

Declaration Number:

Container Number:

Search

Clear

Waste Declaration Forms Found: 8

Declaration Number	Container Number	Description	Location	Hazardous Material
12-b	container2	description	building1	No
12-a	container2	description	building1	Yes
12-b3	container1	description	building1	Yes
12-D	container3	description	location	No
12-b6	container2	description	location	Yes
12-b8	container2	description	building6	No
12-b9	container3	description	location	Yes
200502-003	RWG-1000	concrete block	sector 0	No

# Items Declaration Form

## Item Information

Declaration Number:	<input type="text" value="12-c"/>
Item Description:	<input type="text" value="hazardous material - caution"/>
Location:	<input type="text" value="building 4"/>
Account Number:	<input type="text" value="123456"/>
Hazardous Material:	<input type="text" value="Yes"/>
Generator Name:	<input type="text" value="James"/>
Generation Date:	<input type="text" value="08/04/2021"/>
Received By:	<input type="text" value="SLAC"/>
Received Date:	<input type="text" value="08/04/2021"/>

## Packing Specifications

Select Container:	<input type="text" value="container1 16% capacity"/>
Item Length:	<input type="text" value="4"/>
Item Width:	<input type="text" value="4"/>
Item Height:	<input type="text" value="2"/>

## Calculated Volume

Item Volume:	32.00	inches cubed
Container Volume Before Adding Item:	8.00	inches cubed
Container Volume After Adding Item:	40.00	inches cubed
Volume Filled:	80.00	%

Submit Form



# View Item Page

## Item Information

Declaration Number:	12-b
Container Number:	container2
Description:	description
Location:	building1
Account Number:	21214

## Physical Properties

Hazardous Material:	False
Length:	1
Width:	4
Height:	3
Calculated Volume:	12

## Creation Details

Generator Name:	James
Generation Date:	3/10/2021 12:00:00 AM
Received By:	SLAC
Received Date:	3/10/2021 12:00:00 AM

## Attachments

File Name	Date Submitted	Submitted By
<a href="#">data.png</a>	2021-06-21	James Meadows

# View Shipment Page



## Shipment Information

Shipment Number:	S-23
Shipment Type:	truck
Conveyance:	conveyance

## Containers Included

Container Number	Volume Used	Total Volume	Percent Filled
container2	60 ft cubed	32 ft cubed	187.5 %
container1	8 ft cubed	50 ft cubed	16 %

Add Container

Search..

container2

container1

container3

container4

RWG-1000

The following additional features are planned:

- Expanded report functionality
- Add a 'People' table to track authorization
- More properties stored about burials and shipments

# Final Thoughts

This project is designed to:

- Be expandable
- Have reusable code
- Easy to manage

# Acknowledgements

## **DOE:**

*This work was supported in part by the U.S. Department of Energy, Office of Science, Office of Workforce Development for Teachers and Scientists (WDTS) under the Science Undergraduate Laboratory Internships (SULI) program*

## **Mentors:**

Thanks for all the help from my mentors especially from Ryan Ford and Enrique Cuellar

**Thank You SLAC for everything!**



An aerial photograph of the SLAC National Accelerator Laboratory at sunset. The image shows a large complex of industrial and research buildings, including several large, multi-story concrete structures with flat roofs. A long, straight road or path runs through the center of the facility. The surrounding landscape is hilly and covered in trees and grass. The sky is a warm, golden color from the setting sun. Overlaid on the image are white geometric lines forming a large 'X' shape, with small white circles at the intersections and endpoints.

# Thanks for Attending!

**SLAC**