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The following instructions can be used to build Edward Johnson's CS499 Final Project locally.

I recommend that you use the Docker build/instruction path, as that will handle any dependencies that the project relies on, you will not need to install any additional packages. I say this because I found that at least for my primary computer, running a Debian environment, I needed to have additional dependencies such as "pkg-config" installed in order to build the project from source using the standard local build command for rust "cargo build." If you are on Linux, cargo will let you know if you are missing a dependency, and it is as simple as just executing an install command using your distribution's package manager, ex: apt install pkg-config. Windows systems should not require any additional steps beyond what is described below.

BUILDING WITH DOCKER:

Whether you are on Windows, or on Linux, the first step for this particular path is to install docker.

LINUX DOCKER:

For Linux, the most straight forward way is to use the package manager for your distribution, such as apt for Debian/Ubuntu. That command would look like "apt install docker", if you have any issues building the docker file on Linux with just standard docker, I would recommend adding "apt install docker-compose."
The official docker page for Linux is where I would recommend looking to find the install command for a specific distribution. That can be found here: https://docs.docker.com/desktop/install/linux-install/

WINDOWS DOCKER:

For windows, you will need to download a recent version of docker, and then install it. This can be done using Docker's web page here: https://docs.docker.com/desktop/install/windows-install/

Docker will ask you to log out / reboot if you are on windows, do so, then proceed on to building.

BUILDING:

The next step, is to download the source directory.
Extract the directory, open up a console / terminal emulator of your choice, and then cd into the extracted project directory.

Once you are in the project directory, for example '/home/user/Documents/SNHU/C4/CS499/FinalProject', you will then want to execute the following commands in the terminal, while you are in the project directory.

To build the image, run the following command. NOTE: on Linux, you may need to prepend a 'sudo' to each of these commands before execution if you are given an error regarding permissions

```
docker build -t final_project .
```

Once the image has finished building, to start the container / application, use the following command:

```
docker run -it --rm final_project
```

BUILDING THE PROJECT LOCALLY WITH RUST / CARGO:

The first step will be to download and install rust for your system.

For LINUX/OSX:

This installation is as simple as executing the rustup command from within your terminal:

The command can be found here:
https://www.rust-lang.org/tools/install
and it includes the following curl:

```
curl --proto '=https' --tlsv1.2 -sSf https://sh.rustup.rs | sh
```

For WINDOWS

The command is similarly easy, download the rust installer from the following page:
https://forge.rust-lang.org/infra/other-installation-methods.html
A direct link to the x86_64 version can be found below.
[x86_64-pc-windows-msvc](https://static.rust-lang.org/rustup/dist/x86_64-pc-windows-msvc/rustup-init.exe)

I would recommend using the default installation for both the Linux/OSX and Windows builds. Non-standard installations have not been tested, so there is no guarantee they will operate the same.

BUILDING:

Once you have finished the installation, open up your selected console / terminal emulator.

cd into the main project directory wherever it is downloaded to, ex: 'cd /home/user/Documents/SNHU/C4/CS499/FinalProject'.

The following commands are used to build the project on both Windows, and Linux.

To begin the building process, execute:

```
cargo build
```

When it is finished, you may run the built executable by then running:

```
cargo run
```

You may also directly run the executable that was built in the project directory, but I recommend allowing cargo to handle it.

--- *PROCEED TO DOCUMENTATION OR OPERATING THE APPLICATION*

DOCUMENTATION:

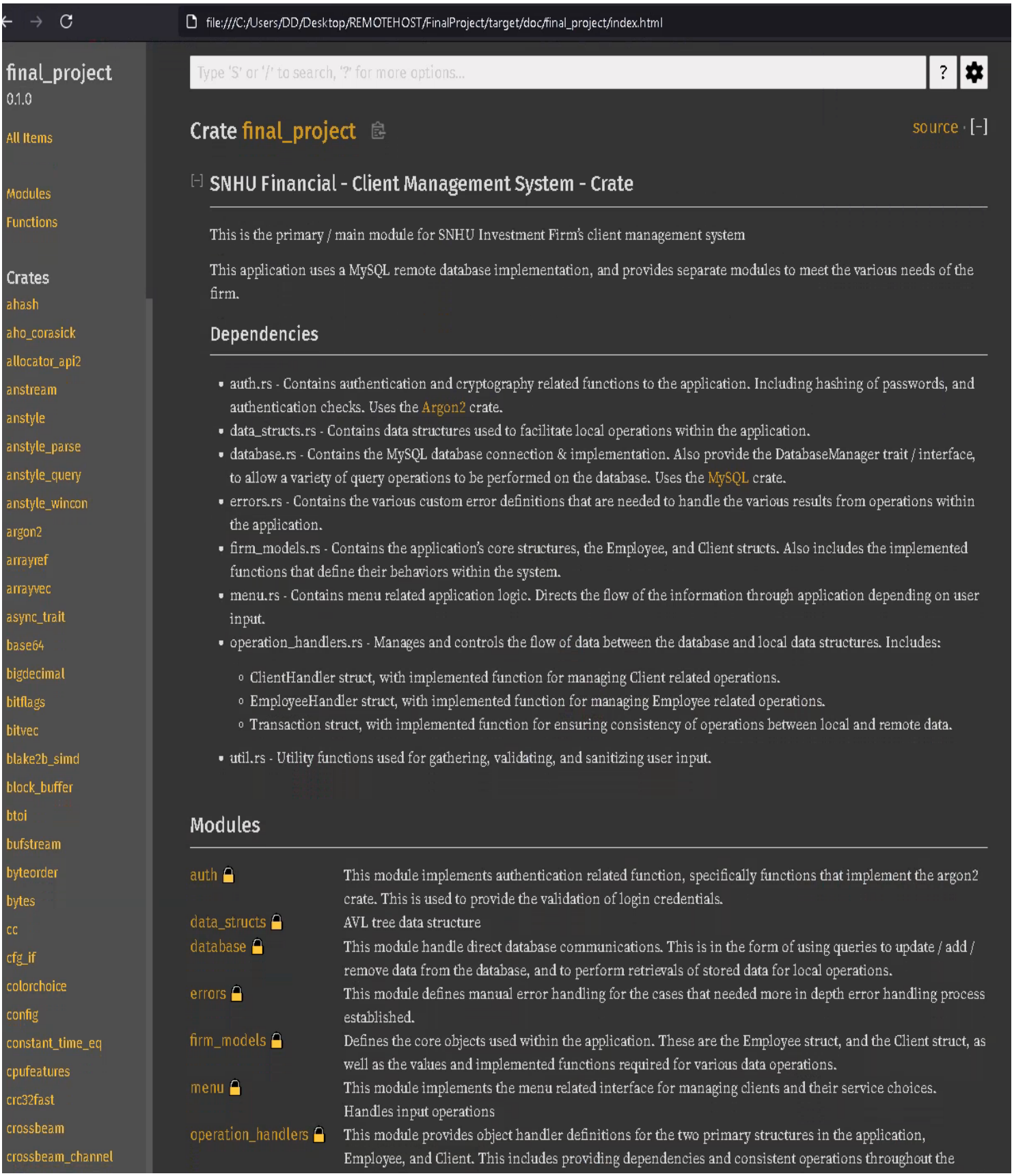
If you would like to build the documentation website / pages for the project, execute the following command while cd'd into the main directory for the project ex: '/home/user/Documents/SNHU/C4/CS499/FinalProject'

```
cargo doc
```

On the windows environment I used to test the cross-platform functionality, the following location is where the index page of the project's documentation wikipedia style html-docs are located. You can also open any of the generated document html pages, and use the search bar, along with one of the trait, enum, strucs, etc from the project, and it will provide you with a description as to what the application component is used for, and what options you have when working with it.

'file:///C:/Users/USERACCOUNT/Desktop/FinalProject/target/doc/final_project/index.html'

An example of these documentation pages for this project can be seen on the following page.


file:///C:/Users/DD/Desktop/REMOTEHOST/FinalProject/target/doc/final_project/index.html
final_project
0.1.0
All Items
Modules
Functions
Crates
ahash
aho_corasick
allocator_api2
anstream
anstyle
anstyle_parse
anstyle_query
anstyle_wincon
argon2
arrayref
arrayvec
async_trait
base64
bigdecimal
bitflags
bitvec
blake2b_simd
block_buffer
btoi
bufstream
byteorder
bytes
cc
cfg_if
colorchoice
config
constant_time_eq
cpufeatures
crc32fast
crossbeam
crossbeam_channel
Type 'S' or '/' to search, '?' for more options...
Crate final_project
source · [-]
SNHU Financial - Client Management System - Crate
This is the primary / main module for SNHU Investment Firm's client management system
This application uses a MySQL remote database implementation, and provides separate modules to meet the various needs of the firm.
Dependencies
auth.rs - Contains authentication and cryptography related functions to the application. Including hashing of passwords, and authentication checks. Uses the Argon2 crate.
data_structs.rs - Contains data structures used to facilitate local operations within the application.
database.rs - Contains the MySQL database connection & implementation. Also provide the DatabaseManager trait / interface, to allow a variety of query operations to be performed on the database. Uses the MySQL crate.
errors.rs - Contains the various custom error definitions that are needed to handle the various results from operations within the application.
firm_models.rs - Contains the application's core structures, the Employee, and Client structs. Also includes the implemented functions that define their behaviors within the system.
menu.rs - Contains menu related application logic. Directs the flow of the information through application depending on user input.
operation_handlers.rs - Manages and controls the flow of data between the database and local data structures. Includes:
ClientHandler struct, with implemented function for managing Client related operations.
EmployeeHandler struct, with implemented function for managing Employee related operations.
Transaction struct, with implemented function for ensuring consistency of operations between local and remote data.
util.rs - Utility functions used for gathering, validating, and sanitizing user input.
Modules
auth
This module implements authentication related function, specifically functions that implement the argon2 crate. This is used to provide the validation of login credentials.
data_structs
AVL tree data structure
database
This module handle direct database communications. This is in the form of using queries to update / add / remove data from the database, and to perform retrievals of stored data for local operations.
errors
This module defines manual error handling for the cases that needed more in depth error handling process established.
firm_models
Defines the core objects used within the application. These are the Employee struct, and the Client struct, as well as the values and implemented functions required for various data operations.
menu
This module implements the menu related interface for managing clients and their service choices. Handles input operations
operation_handlers
This module provides object handler definitions for the two primary structures in the application, Employee, and Client. This includes providing dependencies and consistent operations throughout the

OPERATING THE APPLICATION:

FROM THE LOGIN SCREEN:

The application will then connect to the login screen, at which time you will be able to provide an employee ID and the specific password for the employee of your choice. I have not implemented any user control policies for specific accounts, so they will all have the same access permissions, and will be able to work with the data.

The list of available name and passwords that can be used to log into the system are provided in the main project directory. Contained within the file auth-data.csv.

There are 10 accounts / employees that have client lists assigned to them. Use your selected employee id integer (1-10), and the corresponding password for that id in order to log into the system.

USING THE SYSTEM:

The application is currently limited to the following actions / interactions:
You may display a list of all clients assigned to a specific employee, by providing their employee_id,
You may perform modifications to the services that a client is receiving by providing their client_id,
You may perform modifications to the employee pairing for a client by providing their client_id and the desired employee's id value for which to switch the pairing to,
You may exit the application.

NOTE:

The back end for additional functionality has been implemented, and is working. It is what I used to seed the database with Client/Employee data. These options include adding/removing employee & clients, changing additional client/employee values. But there are currently no menu options available for many of these operations, as I have not had the time to design / implement a user account control system.