

POSTS

Properly Organised Shipment Tracking System
Web Programming 2021-2022

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1 Logic flow of files

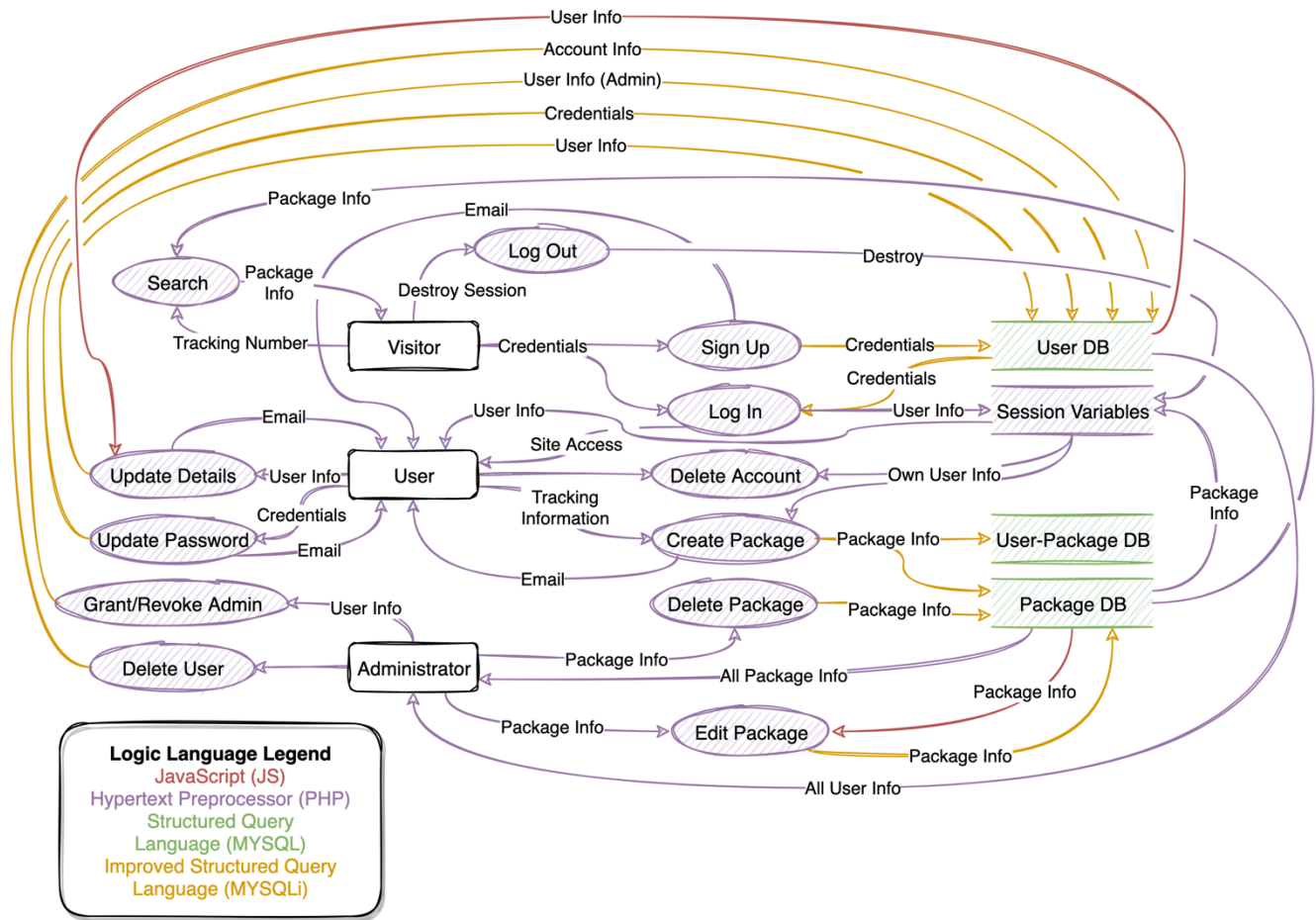


Figure 1: Data Flow Diagram (DFD) depicting the flow of data around input forms, data storage and account processes within the POSTS system.

2 System design

My package tracking system, POSTS was designed with user input validation and security at the upmost importance. On every page are the relevant checks to see if the user is meant to be able to see the page before it is even loaded in the browser. This is to ensure the security of administration features and confidentiality of users' data. A great example of this careful consideration is the dynamic navigation bar present at the top of every page on the website.



Figure 2: Navigation bar as it appears to a visitor while not logged in.

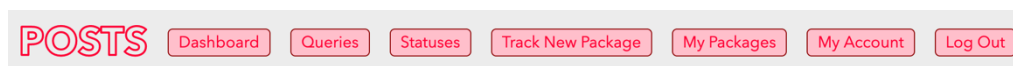


Figure 3: Navigation bar as it appears to an account holder while logged in.

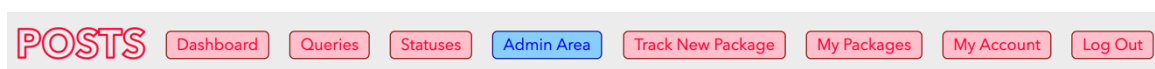


Figure 4: Navigation bar as it appears to an administrator while logged in.

Figure 5: Navigation bar as is appears to an administrator while logged in and on a page other than the dashboard.

A search bar is displayed for all visitors to use - regardless of account or login status. Various checks take place to verify and match the user input to an existing package. If the result is found, the user is taken to a search result page where they can view limited information about the package. If a user is logged in at this stage, they have the option to add this package to their account for ease of use and accessibility. This data is persistent as the relationships between users and their tracked packages are stored separately in the database.

3 Database design and rationale

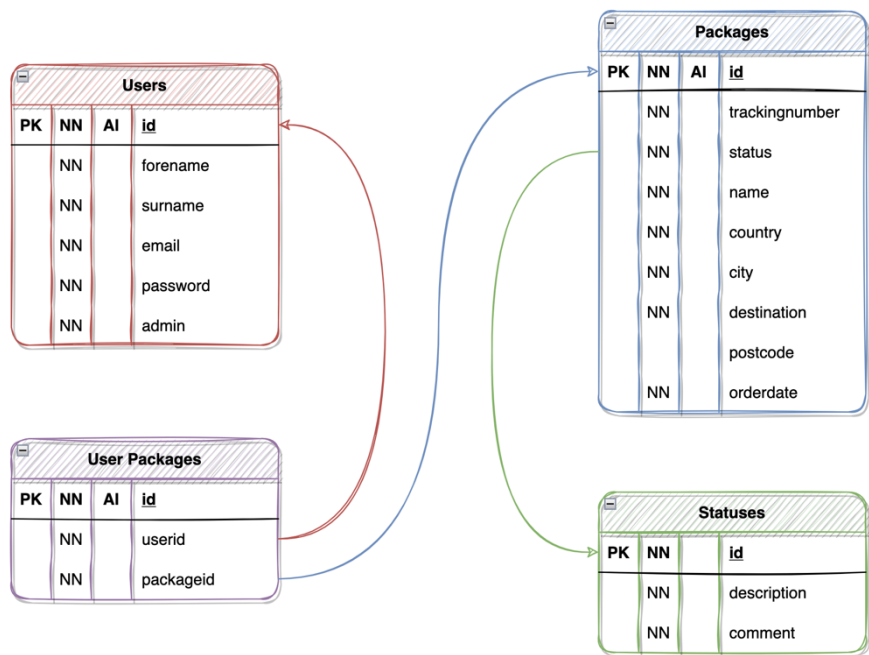


Figure 6: Relational Schema of 2NF database used in the POSTS system.

When designing the database, data normalisation was paramount. As such, users, packages, package statuses, and the link between them are all stored separately as to reduce duplicate data. Inner joins were employed when fetching the database information, resulting in efficient and accurate data retrieval.

4 User interface design

POSTS sports a white-and-red colour scheme, which is reminiscent of envelopes and British First-Class stamps. Automation is used throughout; when a user edits their account credentials, or an administrator edits a package tracking entry, the input fields are dynamically filled so that the user can simply edit the fields wherever necessary instead of having to needlessly enter existing information, limiting the room for user error.

5 Development decisions

The most important development decision that was made was to develop a bespoke function that handles the validity, security, opening and closing of MYSQL database connections, as well as supporting the efficient and sanitary execution of SQL queries to the database. Most importantly, this custom function allows the swift and secure execution of any predefined MYSQL query passed in as a simple parameter.

Since PHP functions cannot be called from button events, the decision was made to handle user input on hidden pages called 'include' pages. These pages contain all the error handling and logic prior to storing the user input into the database vis MySQLi. These pages of course, contain checks that detect if the page is deliberately loaded by the user in their browser by checking if the page was accessed with a submission of a form, which contains data from the previous page. In this case, the user is sent to the dashboard or login page with an error message explaining why the user could not access the page.

6 Tools and methods

I used Visual Studio Code, MYSQL Workbench and Firefox's development tools to aid in development and testing of the web system.

Word count: 498

7 Appendices

7.1 Self-Reflection Sheet

	Yes (works well)	Partially (there are issues)	No (not implemented)
Major requirements			
Login/Logout functions	When a visitor creates an account, a confirmation email is sent to the email address provided. Accountholders can log out and session variables are destroyed.		
Authentication	Administrator status is stored in the user database. Administrators can view extra information and can list all database data inside the website. Only administrators can grant and revoke admin status. They cannot revoke their own administrator status.		
Adding new information	Only accountholders can create package tracking information. Once created, the packages are automatically added to their account so they can view them later without having to look them up.		
Updating information	Accountholders can amend their account information and change their password. Administrators can update and edit package tracking information.		
Deleting information	Accountholders can delete their account by inputting their password backwards on their account page. Administrators can delete both users and packages from the database from the website.		
Listing functionality	Visitors can list the status codes and their respective comments and instructions. Accountholders can list the packages they are currently tracking on the My Packages page. Administrators can list the packages, users, and user-package relationships on the website.		
Viewing details	Visitors can view basic details of searched packages. Accountholders can view extended details of searched and tracked packages. Administrators can view all details of all packages and users.		
Searching	Any visitor can search the package database and view basic information about the tracking status and approximate delivery destination. Accountholders can add searched packages to their account so they can view them without having to look them up again.		
System features			
Sessions used	Session variables are used throughout to support user experience, engagement, email features, and data persistence between pages and forms.		
Encryption via encoding or hashing	Modern PHP password hashing is employed to safely store, compare, and update password in the user database.		

Input validation and sanitisation	A great quantity of input checks are used to ensure only relevant, useful, and compatible data is accepted by the forms used on the website. SQL queries and statements are assembled and prepared only when all user inputs pass all applicable checks.		
User friendliness and usability	User experience and ease of use was prioritised, and features were implemented to improve the user experience throughout. Effort to minimise the event of errors was carefully considered.		

List the third-party libraries, frameworks, scripts, etc. that you used in your assignment:

No external or third-party libraries, frameworks, or scripts were used in the development of this project.

What is the best part of your work?

In my opinion, the most impressive part of this work is how dynamic the website is. For example, when a visitor creates an account, deletes their account, creates a package tracking, or removes a parcel from their tracked packages section, the web system sends an email confirming their action. Session variables are used to aid in user friendliness and avoid accidental detrimental accidents. An example of this is how it is not possible for an administrator to accidentally revoke their own administrator status or delete their account in the user view as these options have been disabled when viewing their own account.

What is the weakest part of your work?

In my opinion, the weakest part of my work is how the user interface looks on mobile. While the website is still usable on mobile devices due to the universal input forms and accessible colour scheme, adaptive design could have been used to resize element based on the viewport used to view the website.

Which part of the assignment you struggled most with?

While I did not struggle with any part of the assignment, I did enjoy the challenge of programming in multiple languages simultaneously. I would find myself retrieving data with MYSQL statements and querying the database with them using MySQLi, handling the database response with PHP logic, formatting the output with PHP functions into browser-friendly HTML elements styles with CSS, and auto-filling forms with JavaScript. I am impressed with what I have learned and using a full-stack environment to develop such an advanced and fulfilling web storage and retrieval system.

7.2 Appendices - Website & Account Credentials

7.2.1 Appendix - Link to Website

<https://s5117801.bucomputing.uk/wpassignment>

<https://s5117801.bucomputing.uk/wpassignment/index.php>

As the assessor marking this work, I, the developer, invite you to fully test my system by creating an account and add and remove a package. This is to demonstrate the checks, email function, and user experience. If you take up this offer, I must remind you to use an email address you have access to demonstrate the email function.

7.2.2 Appendix - Regular User Credentials

Email: regular.user@posts.com

Password: **regular2021**

Checked: YES

7.2.3 Appendix - Administrator Credentials

Email: admin.user@posts.com

Password: **admin2021**

Checked: YES

7.2.4 Appendix - Search Terms to Demonstrate Search Function

Regular Tracking Number: **RH129033958II**

Non-existing Tracking Number: **AB123456789CD** (This will trigger a 'package not found' error)

Invalid Tracking Number: **TRACKME21** (This will trigger a 'please use at least 13 characters' error)

7.2.5 Appendix - Dataset Samples

Users Table:

id	forename	surname	email	password	admin
1	Rufe	Pridding	rpridding0@about.me	kq6hijuuwipteqd97tswnuzf9tro	1
2	Fanni	Corneljes	fcorneljes1@netlog.com	leolqh4bi5zjh0wrtryqcgzpb9yp	0
3	Camila	Macari	cmacari2@google.fr	q59ahfqvkzro8n9rf37by8c9zf85	0
4	Coralie	Sauvain	csauvain3@webnode.com	nqmwsczajhv1pzu1l5nrxqdn4t59	0
5	Horatio	Bonar	hbonar4@arstechnica.com	5nmtq6os7bv4vgfv4rnkhpz3lwh5	1
6	Ailis	Brugman	abrugman5@slashdot.org	0ct3a9bebiusummd7oqdxwrad2pa	0
7	Linette	Kefford	lkefford6@hhs.gov	3xg1d9q0he12wijvxnqhzbroe81z	0
8	Shelly	Fader	sfader7@amazon.co.uk	7a5ojf16cmmgrbrp4kja64mlvb7	0
9	Wells	Duesberry	wduesberry8@tripadvisor.com	uvxnn6opqpmh3jkuqsn10timrrq3	0
10	Elijah	Farrington	efarrington9@google.es	p1w19ll2479cxp95j9cse78vguph	1

Packages table:

id	trackingnumber	status	name	country	city	destination	postcode	orderdate
1	UK614118867RS	P4	Friederike Scini	MU	Vacoas	8 Packers Pass	NULL	04/03/2021
2	PH777039679XN	P1	Evvy McMurty	CN	Hengjie	6 Fisk Road	NULL	29/06/2019
3	MU245826482EI	P2	Manya Corrado	NG	Musawa	3 Katie Court	NULL	08/03/2020
4	JQ137727263SM	P4	Peg Hurton	AR	Laborde	439 Dayton Pass	2657	05/09/2019
5	MV631206409AR	D1	Darby Newick	SE	Mörrum	25 Steensland Alley	375 90	31/03/2020
6	GG907228539VZ	D2	Conway MacGillacolum	CN	Jun'an	6120 Steensland Road	NULL	28/08/2021
7	VS028382069UU	P3	Eula Tandy	CZ	Zásmuky	824 Northwestern Trail	281 44	24/02/2021
8	HM756494006DI	P2	Davidde Marson	CZ	Zbiroh	1 Bartillon Pass	338 08	31/08/2021
9	QT964733432GL	D2	Germaine Ousby	SE	Bromma	98 American Place	167 37	20/02/2019
10	FC187145642IP	P2	Flint Roxbrough	CZ	Trnava	615 Westport Alley	674 01	13/01/2020

User-Packages table:

id	userid	packageid
1	88	118
2	68	746
3	6	420
4	3	447
5	41	99
6	43	324
7	52	445
8	42	557
9	78	244
10	10	409

Status table:

id	description	comment
C1	Withheld	Import fee to be paid
C2	Seized	Package contained illegal contents
D1	Delivered	Package was delivered to addressee
D2	With neighbor	Package was left with neighbour
D3	Ready for pickup	Package must be collected from destination
P1	Postage paid	Sender has paid for postage
P2	Dispatched	Package has been dispatched from source
P3	In transit	Package is en-route to destination
P4	Out for delivery	Package is being delivered shortly
R1	Returned to sender	Package was returned to sender
R2	Returned to depot	Package was returned to depot
U1	Undelivered	Package could not be delivered
U2	Lost in transit	No recent updates have been given
X1	Expired	Tracking number has expired