

Lost and found app : Back2U

An electronic solution for institutions to manage and return lost items

Client: Institutions such as universities, schools, workplaces, etc.

Requirements:

- Records found items to DB: When an item is found, its traits are recorded to the database. This is done via the frontend through a user with privileged access (worker at the institution)
- Records lost items to DB: Anyone who has lost an item fills out a lost item form with the traits and any additional information, which are stored in the DB. This is done via the frontend through any user
- Matches lost and found items: Items found with traits similar to those lost in the DB are matched. Privileged user sees matches, reads additional info, and confirms the match
- Match notification: Person with lost item is notified (email) of a match, the message provides information about where and when to pick up the item
- Confirm and archive match: When the match is confirmed in person and the item is returned, the item, along with the person's credentials, is stored in an archive DB

Design:

- Stealing is prevented by imposing the following design
 - Institution is assumed to be trustworthy, they make the decision to match the item
 - An ordinary user doesn't have access to the found items list, they may only fill out a form
 - Upon pickup, the person's credentials are archived if needed (ex., Police are involved)
- Matching
 - Each category (phone, clothing, etc.) will have its own table and attributes
 - Attributes in tables will have predefined enum values (to promote automated matching)
 - Additional information is specified in a text attribute
 - Other category for others, very general attributes (size, color)
 - For each found item, the app lists all lost forms with at least n matching attributes, sorted in descending no. of matches

Technology stack:

- Application: Python, Reflex
- Frontend: Reflex
- Database: Postgres
- Extras: Docker, Git

User stories

Institution worker:

1. I want to record found items in the database so that lost items can be matched efficiently. (1)
2. I want to have an intuitive interface to view all matches with sorting options so that I can confirm matches with ease. (1)
3. I want to print confirmation receipts when returning a lost item so that there is a physical record of the transaction. (2)
4. I want to message a user who reported a lost item before confirming the match, so that I can ask for more details. (1)
5. I want to confirm a match between a lost and found item so that the rightful owner can retrieve their item. (1)
6. In the UI, I want to see all the details of the lost item and the best match found item side by side so that I can easily compare the 2 to verify the claim. (2)
7. I want all item records to be time-stamped so that I can track when items were reported lost or found. (2)

Institution:

1. I want to track the statistics, such as the number of successful matches, so that I can analyze the effectiveness of the system. (2)
2. I want to remove old or redundant matches, such as spam, because I don't want the database to be flooded with unnecessary entries. (1)
3. I want to restrict the number of lost item reports a user can submit per day so that the system is not spammed. (1)
4. I want to manage accounts and permissions so that only authorized personnel can handle the data. (1)
5. I want to log the actions of privileged users so that we can hold them accountable for all actions taken in the system. (1)
6. I want to monitor how long the item remains unclaimed so that I can decide what to do with it after a set period. (3)
7. I want to allow users to set a preferred communication method so that they can receive match updates in their preferred way. (3)
8. I want to set a custom lost and found policy so that we can define our own rules for handling lost items. (2)
9. I want the app to be containerized because it allows me to easily deploy the app on my own servers, regardless of the OS. (1)
10. I want to be able to easily customize the front end of the app through a config because I want an easy way to tailor the app to my institution. (2)
11. I want to be able to implement my own front end using the well-documented API because I may want to fully customize it. (3)
12. I want to keep an archive of all found items and who took them for legal reasons. (1)

13. I want to configure categories and their traits via a config because the default list might not apply to specialized institutions. (2)
14. I want to have various language options because my institution might be multicultural. (3)
15. I want to ensure maximum user data safety to prevent data theft. (1)
16. I want to configure notifications so that users and staff receive relevant updates. (3)
17. I want to verify that the accounts created belong to my institution so that people from outside the institution can't access our servers. (2)

User:

1. I want to submit a lost item form describing exactly what my item is via categories + drop-down menus and additional information, because I can add specific details preventing misidentification. (1)
2. I want to receive a notification whenever there's a status change because I want to know what's going on with my item. (1)
3. I want to be able to modify the lost request because I want full control over my forms, like correcting mistakes, adding a missing detail, or deleting the form in case I found the item elsewhere. (1)
4. I want to submit images of my lost item so that the worker has more information when matching. (2)
5. I want to receive a confirmation when my lost item form is successfully submitted, so that my request has been recorded. (2)
6. I want to be assured that my request is confirmed by a person because a computer program can make a mistake. (3)
7. I want to be able to claim a false pick-up because someone may impersonate me. (2)
8. I want to schedule a pick-up time and date so that the institution knows when I'm coming. (3)
9. I want to re-request a form after it's timed out because it saves time retyping. (2)
10. I want my data to be stored securely and, after some time, deleted to ensure my privacy. (1)

Acceptance Criteria

Institution Worker (Must-Be)		
ID	User Story	Acceptance Criteria
1	I want to record found items in the database so that lost items can be matched efficiently.	GIVEN a worker is logged in and on the found item submission page, WHEN they fill in the category (from dropdown), select predefined traits (via checkboxes or dropdowns), and optionally provide additional text information, THEN the item is saved to the corresponding category table with a timestamp and worker ID

		<ul style="list-style-type: none"> On success, a toast message confirms submission, saying "Item successfully submitted" Invalid or incomplete input shows inline errors.
2	I want to have an intuitive interface to view all matches with sorting options, so that I can confirm matches with ease.	GIVEN a worker is logged in, WHEN they access the match interface, THEN a list of lost items matches to their found items is shown.
4	I want to confirm a match between a lost and found item so that the rightful owner can retrieve their item.	GIVEN a worker has verified a match between a found and lost item, WHEN they confirm the match in the system, THEN the matched user is notified via email, and the item status is updated to "Ready to Pick Up." <ul style="list-style-type: none"> The UI displays the item for staff in the "return matches" section Workers can only confirm a match from their found item.
5	I want to get a notification after inactivity because I need to be reminded if I forget to check.	GIVEN a worker has not interacted with the system after 10 days with no activity, WHEN there are pending matches, THEN the system sends a reminder via email.
Institution (Must-Be)		
ID	User Story	Acceptance Criteria
1	I want old or redundant matches/lost items, such as spam, to be automatically deleted because I don't want the database to be flooded with unnecessary entries.	GIVEN a match or unmatched lost item has existed beyond a configured time threshold, WHEN the threshold is reached, THEN it is deleted from the database.
2	I want to restrict the number of lost item reports a user can submit per day so that the system is not spammed.	GIVEN a user account is submitting lost item reports, WHEN they exceed the institution-defined daily limit, THEN the system blocks further submissions and shows: "Daily report limit reached." <ul style="list-style-type: none"> Limit resets every 12 hours.
3	I want to create and delete accounts with or without worker privileges so that only	GIVEN an admin is logged in, WHEN they access the admin dashboard

	authorized personnel can handle the data.	THEN they can create or delete accounts with either user, worker or admin role
4	I want the app to be containerized because it allows me to easily deploy the app on my own servers, regardless of the OS.	GIVEN the application is being deployed, WHEN the institution sets up the app using Docker, THEN it must run consistently across different server environments regardless of the host OS. <ul style="list-style-type: none"> • Docker Compose config provided for consistent setup. • App is distributed in a simple package containing Readme instructions
5	I want to keep an archive of all matches and who took them for legal reasons.	GIVEN a match is confirmed and the item is returned, WHEN the transaction is finalized by the institution worker, THEN the system stores the found item details (description + traits in a string) along with the claimant's verified credentials (name, surname, PESEL) and a timestamp in an archive database.
6	I want to ensure maximum user data safety to prevent data theft.	GIVEN the system stores or transmits personal user data, WHEN these operations occur, THEN the data must be encrypted using HTTP/TLS in transit. <ul style="list-style-type: none"> • Access is restricted via role-based permissions. • Passwords are hashed (e.g., bcrypt).
User (Must-Be)		
1	I want to submit a lost item form describing exactly what my item is via categories and dropdown menus, and add specific details, because it prevents misidentification.	GIVEN a user is on the lost item submission page, WHEN they select a category (from dropdown), choose item traits (checkboxes or dropdowns), and enter optional additional text, THEN the item is saved to the category's table with a timestamp and user ID <ul style="list-style-type: none"> • On success, a toast message confirms form submission. • Inline validation errors are shown for missing or invalid fields.
2	I want to receive a notification whenever there's a status	GIVEN a user has submitted a lost item report, WHEN the status of that report is updated by the

	change because I want to know what's going on with my item.	system or staff, THEN the user receives a notification via email <ul style="list-style-type: none"> The notification includes: item ID, new status, and a timestamp.
3	I want to be able to modify the lost request because I want full control over my forms, like correcting mistakes, adding missing details, or deleting the form if I found the item.	GIVEN a user is logged in and on the "My Submissions" page, WHEN they click "Edit" or "Delete" next to a form, THEN the corresponding form opens for editing or is removed from the system with a confirmation prompt. <ul style="list-style-type: none"> Edit updates the existing record with a new timestamp.
4	I want my data to be stored securely and, after some time, deleted to ensure my privacy.	GIVEN a user submits a lost item report, WHEN the configured time threshold expires or the user deletes their data, THEN all associated data is permanently deleted from the system and no longer accessible. <ul style="list-style-type: none"> Data is encrypted at rest and in transit Users are notified via email before automatic deletion and can extend retention once.

Institution Worker (Should-Be)		
ID	User Story	Acceptance Criteria
1	I want to be able to print a confirmation receipt when returning a lost item so that there is a physical record of the transaction.	GIVEN an institution worker has confirmed a match between a lost and found item, WHEN they return the item, THEN a printable confirmation receipt with transaction details should be generated. <ul style="list-style-type: none"> A success toast message is shown: "Receipt generated successfully." Upon marking a match as "Picked up", a button to generate a receipt is displayed Generates a PDF file containing the item, its description, and the credentials of the person who picked up the item (from their account)
Institution (Should-Be)		
ID	User Story	Acceptance Criteria

1	I want to track the statistics, such as the number of successful matches, so that I can analyze the effectiveness of the system	<p>GIVEN the institution wants to analyze statistics on the lost and found efficiency, WHEN the institution accesses their dashboard, THEN counters for the number of items of each status are displayed</p> <ul style="list-style-type: none"> • The statistics are gathered from counting the number of lost/found items as well as the type of matches • The data is dynamically loaded into the dashboard main page
2	I want to write a custom lost and found policy visible for all users so that we can define our own rules for handling found items	<p>GIVEN the institution has specific rules for handling found items (eg, how long they keep them), WHEN the institution accesses their dashboard, THEN they can write a custom policy as well as define rules for how long records stay in the database</p> <ul style="list-style-type: none"> • The lost and found policy is visible for users on the main page • The options are in the “Lost and Found Policy” page
3	I want to be able to easily customize the front end of the app through a config because I want an easy way to tailor the app to my institution	<p>GIVEN the institution wants to modify their frontend with little effort, WHEN an institution accesses their dashboard, THEN they can customize the frontend appearance</p> <ul style="list-style-type: none"> • Options include the institution's name, logo, and banner • The options are configured with the config utility
4	I want to verify that the accounts created belong to my institution so that people from outside the institution can't access our servers.	<p>GIVEN a user attempts to create an account WHEN they enter their registration details THEN their affiliation with the institution is verified through institution-provided credentials and email domain validation</p> <ul style="list-style-type: none"> • These options are configured with the config utility
User (Should-Be)		
1	I want to submit images of my lost item so that the worker has more information when matching.	<p>GIVEN a user is submitting or editing a lost item form, WHEN they upload one or more images of the item, THEN the images are stored securely and linked to the item record.</p>

2	I want to receive a confirmation when my lost item form is successfully submitted, so that my request has been recorded.	GIVEN a user has completed and submitted a lost item form, WHEN the form passes validation and is saved, THEN a confirmation email is sent to the user. <ul style="list-style-type: none"> The confirmation includes an item ID, timestamp, and summary of the item details.
3	I want to be able to claim a false pick-up because someone may impersonate me.	GIVEN a user sees a "Picked Up" status on their item, WHEN they believe the pickup was unauthorized and click "Report False Pickup", THEN the system logs a dispute and alerts staff for manual review. <ul style="list-style-type: none"> A message confirms the report was received and is under review. Admins can view items and investigate the report through the admin dashboard.
4	I want to extend a lost item once it's close to being timed-out because it saves time retyping.	GIVEN a lost item form has 3 days to be deleted, WHEN the user selects "extend" on the old form, THEN a new draft is created pre-filled with previous inputs. <ul style="list-style-type: none"> Users can edit and resubmit the draft as a new request.

Institution Worker (Could-Be)		
ID	User Story	Acceptance Criteria
1	I want to message a user who reported a lost item before confirming the match, so that I can ask for more details.	GIVEN a privileged user is logged in, WHEN they open a potential match, THEN a messaging interface appears, allowing secure text exchange. <ul style="list-style-type: none"> Messages are stored with timestamps in the system. If the message fails to send, THEN "Message is unsent."
Institution (Could-Be)		
ID	User Story	Acceptance Criteria
1	I want to monitor time period of unclaimed items	GIVEN an institution wants to track unclaimed items, WHEN they need to see the details of a specific item,

		<p>THEN they should see how long the item has remained unclaimed</p> <ul style="list-style-type: none"> • The time period is displayed as the number of days since the reporting of the item • If the item has remained unclaimed for too long, it is given to the admin to decide what is to be done with it
2	I want to configure multiple language options	<p>GIVEN the institution has a multilingual and/or multicultural user base, WHEN they add the language options to the app via the admin dashboard, THEN the app should provide users with language options to enhance their experience</p> <ul style="list-style-type: none"> • The language of each text label is different for each language, and depending upon the language selection, a different form is chosen • The language list and other required variables are set from the config file of the app
3	I want to be able to configure notifications	<p>GIVEN the institution wants to change notification settings, WHEN they configure the notification options for staff and users, THEN the app should send relevant updates to the users according to the configuration</p> <ul style="list-style-type: none"> • Notification text structure is different for different institutions, and the text within can be changed to adapt to different usages of the app • The notification structure is configurable from the admin dashboard
4	I want to configure categories and their traits via a config because the default list might not apply to specialized institutions	<p>GIVEN an institution has custom item categories (eg, lab apparatus), WHEN an admin accesses their dashboard, THEN they can add, delete, or modify new item categories and their traits</p> <ul style="list-style-type: none"> • For each category, a new table in the database is created • These categories are visible to all accounts alongside the default item categories • The options are in the “Configure” page
User (Could-Be)		

ID	User Story	Acceptance Criteria
1	I want to be able to schedule a pick-up time	<p>GIVEN a user has an item matched and ready to be picked up, WHEN they want to schedule a comfortable time slot to pick up the lost item, THEN the app must inform the institution worker about the time slot so they can get the item ready for pickup</p> <ul style="list-style-type: none"> • The scheduling is done in the standard manner by selecting a valid date from a calendar drop-down and picking a suitable time • The app only shows dates and times when the pickup would be possible from the institution's side