CacheNCarry

Where "left behind" meets `LEFT JOIN`.

CacheNCarry is an end-of-semester storage management system designed to track and manage student belongings (cloakroom luggage + a mattress). The system ensures easy check-in/check-out processes, reduces human error, and provides traceability for checked-in bags and misplaced mattresses.

Flow

1. Student Registration:

At the end of each semester, a `student` registers their `belonging(s)`:

- Belongings can be of two types: `luggage` or `mattress`.
- Each item is assigned a unique `UUID`.
- A QR code is generated for each item and must be printed and physically attached to the respective belonging by the student.

2. Item Check-In:

At the warehouse:

- A `staff` member scans a QR code on the student's phone to begin a `session`, associating the session with that student, and logging check-in time.
- The QR codes on each belonging are scanned to link them to the student and register them into the system.
- The staff ends the session once all items have been scanned.

3. Storage Period:

- Belongings remain in the warehouse during the student's absence.
- Mattresses are handled separately: at the start of the semester, they are moved directly to student rooms by university workers.

4. Item Retrieval (Check-Out):

Upon the student's return:

- The student visits the warehouse.
- Staff scan the student’s QR code to open a check-out session.
- For each item:
  - **Luggage**: The system validates whether the scanned luggage belongs to the student in session. If ownership does not match, the item cannot be checked out.
  - **Mattress**: Since the mattress is already placed in the student’s room, the staff scan both the student and the mattress QR code to validate ownership.

- The staff ends the session once all items have been scanned.

5. Misplacement Handling:

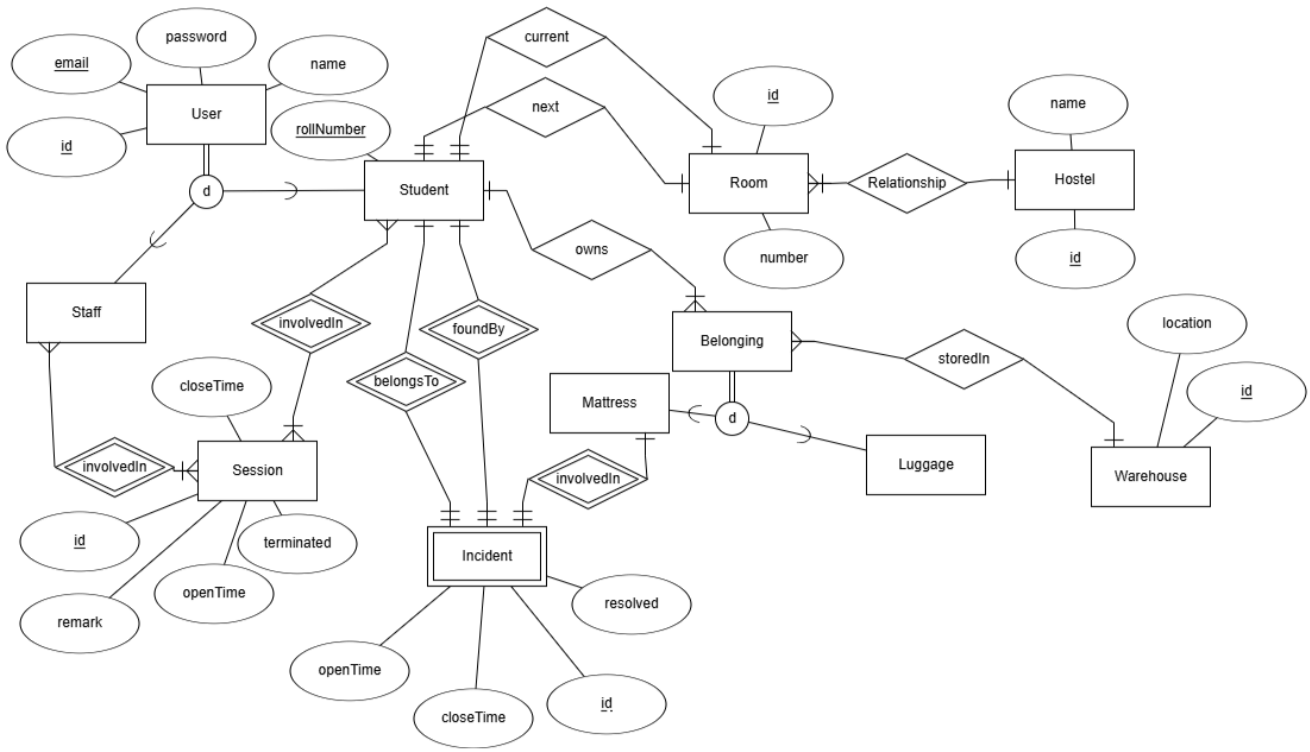
If a scanned mattress does not belong to the student:

- An `incident` is opened.
- Because all mattresses are uniquely tagged and linked to their rightful owners, it can be easily determined:
  - Who the mattress actually belongs to.
  - Who mistakenly received another student's mattress.
- This allows staff to resolve such incidents efficiently without manual investigation.

🔧 Tech stack

- **Frontend & API**: SvelteKit + TailwindCSS
- **Database**: MySQL
- **DB Connector**: Prisma
- **Containerization**: Docker

✏️ Entity Relationship Diagram



📋 Schema Overview

Entities

`user`

All students and staff register as `users`.

Field	Type	Constraints	Description
`id`	VARCHAR(191)	PRIMARY KEY	`UUID` identification for user
`name`	VARCHAR(191)		user's real name
`email`	VARCHAR(191)	UNIQUE	unique organization email id
`password`	VARCHAR(191)	UNIQUE	hashed password

`staff`

A `staff` member oversees sessions and incidents.

Field	Type	Constraints	Description
`id`	VARCHAR(191)	PRIMARY KEY, FOREIGN KEY (`user.id`)	`UUID` identification for staff corressponding to user

`student`

A `student` can register their items and check them in with QR codes attached to them.

Field	Type	Constraints	Description
`id`	VARCHAR(191)	PRIMARY KEY, FOREIGN KEY (`user.id`)	`UUID` identification for student corressponding to user
`roll_number`	VARCHAR(12)	UNIQUE	unique roll number
`current_room_id`	VARCHAR(191)	FOREIGN KEY (`room.id`)	`UUID` identification of current occupancy
`next_room_id`	VARCHAR(191)	FOREIGN KEY (`room.id`), NULLABLE	`UUID` identification of next occupancy

`hostel`

A `hostel` is a place of residence containing rooms.

Field	Type	Constraints	Description
`id`	VARCHAR(191)	PRIMARY KEY	`UUID` identification for hostel
`name`	VARCHAR(191)	PRIMARY KEY	name of the hostel

`room`

Represents a `room` within a hostel.

Field	Type	Constraints	Description
`id`	VARCHAR(191)	PRIMARY KEY	`UUID` identification for a room
`number`	VARCHAR(6)	UNIQUE per hostel (`hostel_id`, `number`)	hostel room number
`hostel_id`	VARCHAR(191)	FOREIGN KEY (`hostel.id`)	`UUID` identification for the corressponding hostel

`warehouse`

A `warehouse` is a physical storage unit for student belingings.

Field	Type	Constraints	Description
`id`	VARCHAR(191)	PRIMARY KEY	`UUID` identification for a warehouse
`location`	VARCHAR(191)		information about general location

`belonging`

A `belonging` is a general entity for storable items.

Field	Type	Constraints	Description
`id`	INTEGER	PRIMARY KEY	`UUID` identification for each belonging
`description`	VARCHAR(191)	NULLABLE	general description of the item
`is_checked_in`	BOOLEAN	DEFAULT FALSE	indication of whether the item is checked in
`checked_in_at`	DATETIME	NULLABLE	timestamp for when the item was checked in
`checked_out_at`	DATETIME	NULLABLE	timestamp for when the item was checked out
`student_id`	VARCHAR(191)	FOREIGN KEY (`student.id`)	`UUID` identification for the owning student
`warehouse_id`	VARCHAR(191)	FOREIGN KEY (`warehouse.id`), NULLABLE	`UUID` identification for the storage warehouse

`luggage`

Student `luggage` that can be checked in and out in direct sessions.

Field	Type	Constraints	Description

Field	Type	Constraints	Description
id	VARCHAR(191)	PRIMARY KEY, FOREIGN KEY (belonging.id)	UUID identification for each bag

mattress

A mattress can be stored over the semester break, and gets transported to a student's room before they arrive. An ownership discrepancy leads to an incident.

Field	Type	Constraints	Description
id	VARCHAR(191)	PRIMARY KEY, FOREIGN KEY (belonging.id)	UUID identification for a mattress

session

Represents a warehouse interaction involving a student and staff member.

Field	Type	Constraints	Description
id	VARCHAR(191)	PRIMARY KEY	UUID identification for each session
remark	VARCHAR(191)	NULLABLE	Optional notes about the session
open_time	DATETIME	DEFAULT NOW()	timestamp for when the session started.
close_time	DATETIME	NULLABLE	timestamp for when the session ended.
terminated	BOOLEAN	DEFAULT FALSE	indication of whether the session was manually terminated.
staff_id	VARCHAR(191)	FOREIGN KEY (staff.id)	UUID identification for the staff member managing the session
student_id	VARCHAR(191)	FOREIGN KEY (student.id), UNIQUE per staff (staff_id, student_id)	UUID identification for the student who owns the belongings

incident

Represents misplacement or ownership conflict involving mattresses.

Field	Type	Constraints	Description
id	VARCHAR(191)	PRIMARY KEY	UUID identification for each incident.

Field	Type	Constraints	Description
`mattress_id`	VARCHAR(191)	FOREIGN KEY (`mattress.id`)	`UUID` identification for the mattress involved in the incident.
`found_by`	VARCHAR(191)	FOREIGN KEY (`student.id`)	`UUID` identification for the student who discovered the misplaced mattress.
`belongs_to`	VARCHAR(191)	FOREIGN KEY (`student.id`)	`UUID` identification for the student to whom the mattress actually belongs.
`resolved`	BOOLEAN	DEFAULT FALSE	indication of whether the incident has been resolved.
`open_time`	DATETIME	DEFAULT `NOW()`	timestamp for when the incident was reported.
`close_time`	DATETIME	NULLABLE	timestamp for when the incident was resolved.

Constraints

Table	Foreign Key	References	On Delete	On Update
`staff`	`id`	`user(id)`	CASCADE	CASCADE
`student`	`id`	`user(id)`	CASCADE	CASCADE
`student`	`current_room_id`	`room(id)`	RESTRICT	CASCADE
`student`	`next_room_id`	`room(id)`	SET NULL	CASCADE
`room`	`hostel_id`	`hostel(id)`	CASCADE	CASCADE
`belonging`	`student_id`	`student(id)`	RESTRICT	CASCADE
`belonging`	`warehouse_id`	`warehouse(id)`	SET NULL	CASCADE
`luggage`	`id`	`belonging(id)`	CASCADE	CASCADE
`mattress`	`id`	`belonging(id)`	CASCADE	CASCADE
`session`	`staff_id`	`staff(id)`	RESTRICT	CASCADE
`session`	`student_id`	`student(id)`	RESTRICT	CASCADE
`incident`	`mattress_id`	`mattress(id)`	RESTRICT	CASCADE
`incident`	`found_by`	`student(id)`	RESTRICT	CASCADE
`incident`	`belongs_to`	`student(id)`	RESTRICT	CASCADE

Database Normalization

The following is a concise normalization analysis for each table:

`user`

```
CREATE TABLE `user` (
    `id` VARCHAR(191) NOT NULL,
    `name` VARCHAR(191) NOT NULL,
    `email` VARCHAR(191) NOT NULL,
    `password` VARCHAR(191) NOT NULL,

    UNIQUE INDEX `user_email_key`(`email`),
    PRIMARY KEY (`id`)
)
```

- **1NF**: All attributes atomic
- **2NF**: All non-key attributes depend on full `PRIMARY KEY` (`id`)
- **3NF**: No transitive dependencies

staff

```
CREATE TABLE `staff` (
    `id` VARCHAR(191) NOT NULL,

    PRIMARY KEY (`id`)
)
```

- **1NF**: Minimal table structure
- **2NF**: Inherits `PRIMARY KEY` from `user` (no partial dependencies)
- **3NF**: No non-key dependencies

student

```
CREATE TABLE `student` (
    `id` VARCHAR(191) NOT NULL,
    `rollNumber` VARCHAR(12) NOT NULL,
    `current_room_id` VARCHAR(191) NOT NULL,
    `next_room_id` VARCHAR(191) NULL,

    UNIQUE INDEX `student_rollNumber_key`(`rollNumber`),
    UNIQUE INDEX `student_current_room_id_key`(`current_room_id`),
    UNIQUE INDEX `student_next_room_id_key`(`next_room_id`),
    PRIMARY KEY (`id`)
)
```

- **1NF**: Atomic values
- **2NF**: `roll_number` depends on full `PRIMARY KEY`
- **3NF**: `room` references are ID-only (no transitive dependencies)

hostel

```
CREATE TABLE `hostel` (
    `id` VARCHAR(191) NOT NULL,
    `name` VARCHAR(191) NOT NULL,

    PRIMARY KEY (`id`)
)
```

- **1NF**: Simple structure
- **2NF**: Single attribute depends on `PRIMARY KEY`
- **3NF**: No non-key dependencies

`room`

```
CREATE TABLE `room` (
    `id` VARCHAR(191) NOT NULL,
    `number` VARCHAR(6) NOT NULL,
    `hostel_id` VARCHAR(191) NOT NULL,

    UNIQUE INDEX `room_hostel_id_number_key`(`hostel_id`, `number`),
    PRIMARY KEY (`id`)
)
```

- **1NF**: Proper identifiers
- **2NF**: Composite unique key (`hostel_id` + `number`) depends on `PRIMARY KEY`
- **3NF**: No derived attributes

`warehouse`

```
CREATE TABLE `warehouse` (
    `id` VARCHAR(191) NOT NULL,
    `location` VARCHAR(191) NOT NULL,

    PRIMARY KEY (`id`)
)
```

- **1NF**: Basic table
- **2NF**: Single non-key attribute
- **3NF**: No dependencies

`belonging`

```
CREATE TABLE `belonging` (
    `id` VARCHAR(191) NOT NULL,
    `description` VARCHAR(191) NULL,
    `is_checked_in` BOOLEAN NOT NULL DEFAULT false,
```

```
    `student_id` VARCHAR(191) NOT NULL,
    `warehouse_id` VARCHAR(191) NULL,
    `checked_in_at` DATETIME(3) NULL,
    `checked_out_at` DATETIME(3) NULL,

    PRIMARY KEY (`id`)
)
```

- **1NF**: Atomic fields
- **2NF**: All attributes depend on `PRIMARY KEY`
- **3NF**: `warehouse` reference is ID-only

`luggage/mattress`

```
CREATE TABLE `luggage` (
    `id` VARCHAR(191) NOT NULL,

    PRIMARY KEY (`id`)
)

CREATE TABLE `mattress` (
    `id` VARCHAR(191) NOT NULL,

    PRIMARY KEY (`id`)
)
```

- **1NF**: Inherited `PRIMARY KEY`
- **2NF**: No additional attributes
- **3NF**: Inherited normalization from `belonging`

`session`

```
CREATE TABLE `session` (
    `id` VARCHAR(191) NOT NULL,
    `remark` VARCHAR(191) NULL,
    `open_time` DATETIME(3) NOT NULL DEFAULT CURRENT_TIMESTAMP(3),
    `close_time` DATETIME(3) NULL,
    `terminated` BOOLEAN NOT NULL DEFAULT false,
    `staff_id` VARCHAR(191) NOT NULL,
    `student_id` VARCHAR(191) NOT NULL,

    UNIQUE INDEX `session_staff_id_student_id_key`(`staff_id`, `student_id`),
    PRIMARY KEY (`id`)
)
```

- **1NF**: Proper structure
- **2NF**: All attributes depend on `PRIMARY KEY`

- **3NF**: `staff`/`student` references are ID-only

`incident`

```
CREATE TABLE `incident` (
    `id` VARCHAR(191) NOT NULL,
    `found_by` VARCHAR(191) NOT NULL,
    `belongs_to` VARCHAR(191) NOT NULL,
    `mattress_id` VARCHAR(191) NOT NULL,
    `resolved` BOOLEAN NOT NULL DEFAULT false,
    `open_time` DATETIME(3) NOT NULL DEFAULT CURRENT_TIMESTAMP(3),
    `close_time` DATETIME(3) NULL,

    UNIQUE INDEX `incident_found_by_key`(`found_by`),
    UNIQUE INDEX `incident_belongs_to_key`(`belongs_to`),
    UNIQUE INDEX `incident_mattress_id_key`(`mattress_id`),
    PRIMARY KEY (`id`)
)
```

- **1NF**: Atomic values
- **2NF**: All fields relate to `PRIMARY KEY`
- **3NF**: `mattress`/`student` references are ID-only

Trigger Deep Dive

`belonging_checkin_log`

```
CREATE TRIGGER belonging_checkin_log
    BEFORE UPDATE ON belonging
    FOR EACH ROW
        BEGIN
            IF OLD.is_checked_in = FALSE AND NEW.is_checked_in = TRUE THEN
                SET NEW.checked_in_at = NOW();
            END IF;
        END;
```

Logic:

- WHEN: `is_checked_in` changes false → true
- WHAT: Sets `checked_in_at` to current timestamp
- WHY: Logging check-in request time

`belonging_checkout_log`

```
CREATE TRIGGER belonging_checkout_log
    BEFORE UPDATE ON belonging
```

```
    FOR EACH ROW
        BEGIN
            IF OLD.is_checked_in = TRUE AND NEW.is_checked_in = FALSE THEN
                SET NEW.checked_out_at = NOW();
            END IF;
        END;
```

Logic:

- WHEN: `is_checked_in` changes true → false
- WHAT: Sets `checked_out_at` to current timestamp
- WHY: Logging check-out request time

`session_log`

```
CREATE TRIGGER session_log
            BEFORE UPDATE ON session
            FOR EACH ROW
                BEGIN
                    IF OLD.terminated = FALSE AND NEW.terminated = TRUE THEN
                        SET NEW.close_time = NOW();
                    END IF;
                END;
```

Logic:

- WHEN: `terminated` changes false → true
- WHAT: Sets `close_time` to current timestamp
- WHY: Logging session close time

`incident_log`

```
CREATE TRIGGER incident_log
            BEFORE UPDATE ON incident
            FOR EACH ROW
                BEGIN
                    IF OLD.resolved = FALSE AND NEW.resolved = TRUE THEN
                        SET NEW.close_time = NOW();
                    END IF;
                END;
```

Logic:

- WHEN: `resolved` changes false → true
- WHAT: Sets `close_time` to current timestamp
- WHY: Logging incident close time