

Problem Description and proposal:

As of this year, ten out of the sixteen land species of hermit crab have been spotted wearing 'artificial shells' such as lego pieces, bottle caps, broken light bulbs, and much more. Although the effects of using 'artificial shells' aren't yet researched in a lot of detail, scientists have already found out that countless crabs have died by getting stuck in wheels or water bottles, thinking of making those objects into their new home. My proposed project is a database for a startup company that can 3D print safer and better shells for hermit crabs.

I am making a database for a company that 3D prints shells for hermit crabs to use as homes. The shells will be created using 3D printers at factories, where the environmental impact will be closely monitored. Each 3D shell produced will have a monitor that keeps track of the crab's health. The database will also have information on the people involved, such as the employees in the 3D printer factories and scientists observing the hermit crabs.

Nouns

- Shells
- Crabs
- Factories
- Printers
- Health monitors
- Employees
- Scientists

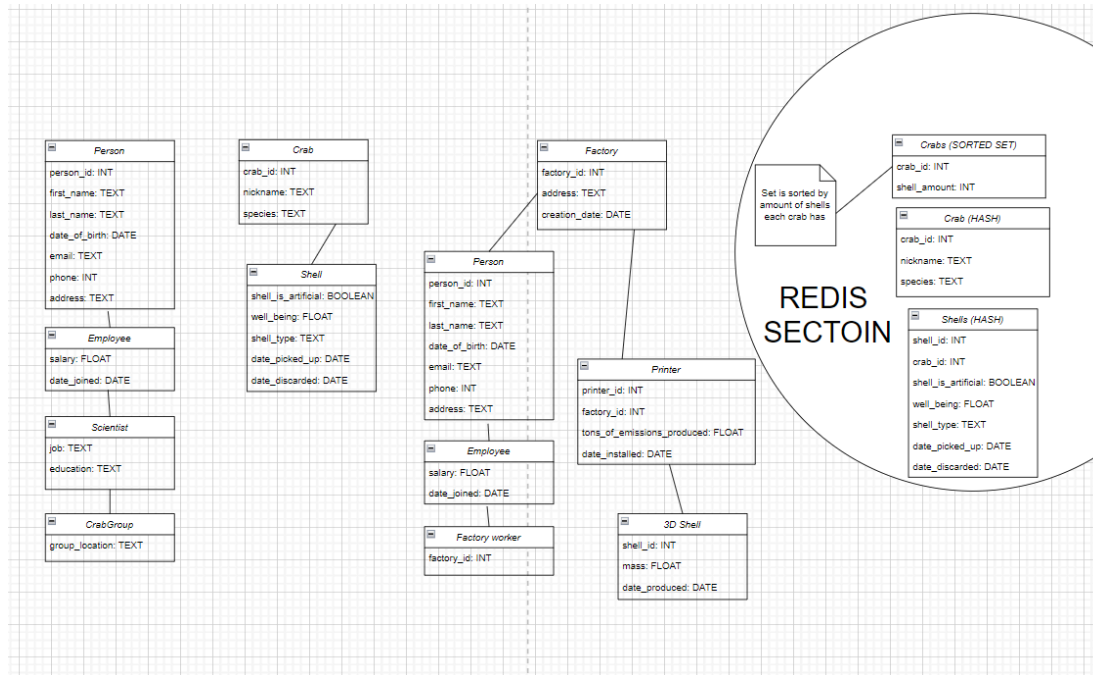
Verbs

- Manufacture
- Equip
- Monitor
- Record
- Document
- Study
- Access
- Observe

Rules of the Database:

- 1) Each 3D-printed shell must be equipped with a health monitor for tracking the crab's well-being.
- 2) Information on the manufacturing process, including the factory and printers used, must be recorded and monitored for environmental impact.
- 3) Data on the crabs, including general classifications and crabs with 3D shells, must be maintained.
- 4) 3D shells must all be divided into groups based on the location where the shells were originally placed.
- 5) Personnel involved in the project, such as factory employees and scientists studying the crabs, need to be documented.
- 6) Scientists assigned to shell groups should have access to monitoring tools to observe the assigned crabs' behavior and health.

Link to the UML diagram:



<https://drive.google.com/file/d/1x4-Ncc4ipYcq9NcAbxSnOqSebv5DiAyp/view?usp=sharing>

Explanation of Redis Elements:

The purpose of Redis in this program would be for scientists to easily get live updated data on crabs and their corresponding shells.

Example data used for project:

Sorted set that sorts crab by the amount of shells they have worn throughout the time they were tracked. Member represents the crab_id, while Score represents shell #.

SORTED SET

crabs

71 B

Length: 3

TTL: No limit

now

Member	Score
7	2
1	1
13	0

Hashes of crabs that have ever been tracked. Reside under the crabs namespace. Easily changed if other animals are being tracked by renaming to animals:id:crab

HASH

crabs:7:crab

Key Size: 118 B

Length: 3

TTL: No limit

Last refresh: < 1 min

Unicode

Add Fields

Field	Value
crab_id	7
nickname	Blossom
species	Coconut Crab

HASH

crabs:1:crab

Key Size: 121 B

Length: 3

TTL: No limit

Last refresh: now

Unicode

Add Fields

Field	Value
crab_id	1
nickname	Sky
species	Spotted Hermit Crab

Hashes of shells. Shows how one shell could belong to multiple crabs and one crab can have multiple shells.

HASH

crabs:1:shells:3

210 B

Length: 7

TTL: No limit

< 1 min

Field	Value
shell_id	3
crab_id	1
shell_is_artificial	false
well_being	9.3
shell_type	wheel
date_picked_up	5/14/2021
date_discarded	8/28/2021

HASH

crabs:7:shells:36

214 B

Length: 7

TTL: No limit

now

Field	Value
shell_id	36
crab_id	7
shell_is_artificial	true
well_being	78.8
shell_type	null
date_picked_up	01/26/2021
date_discarded	03/07/2021

HASH

crabs:7:shells:3

212 B

Length: 7

TTL: No limit

now

Field	Value
shell_id	3
crab_id	7
shell_is_artificial	false
well_being	7.4
shell_type	wheel
date_picked_up	03/07/2021
date_discarded	05/08/2021

Hierarchy of sample data:

Results: 6. Scanned 6 / 6				Last refresh: < 1 min	
crabs		83%	5		
1		33%	2		
shells		17%	1		
HASH	3	No limit	210 B		
HASH	crab	No limit	121 B		
7		50%	3		
shells		33%	2		
HASH	3	No limit	212 B		
HASH	36	No limit	214 B		
HASH	crab	No limit	118 B		
SORTED SET	crabs	No limit	71 B		

Commands to interact with Redis structure:

- Initialize:
FLUSHALL
- Show the top 2 crabs that have gone through the most shells
ZREVRANGE crabs 0 1 WITHSCORES
- When crab with id 7 picks up 4 more shells:
ZINCRBY crabs 4 "7"
- When a mistake was made, and crab with id 1 picked up 1 less shell:
ZINCRBY crabs -1 "1"
- Add a new crab to the database:
HSET crabs:5:crab crab_id 5 nickname Ruby species "Caribbean Hermit Crab"
- Get all info about the crab added:
HGETALL crabs:5:crab
- Remove the nickname of the newly added crab
HDEL crabs:5:crab nickname