



# INSTITUTO SUPERIOR TÉCNICO

2ND QUARTER 2021/2022

Information Systems and Databases

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## SIBD Project - Part 1

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December 15, 2021

# 1 Entity-Association Model Diagram

The proposed Entity-Association Model (E-A Model) for the described *Boating Management System* is presented in **Figure 1**.

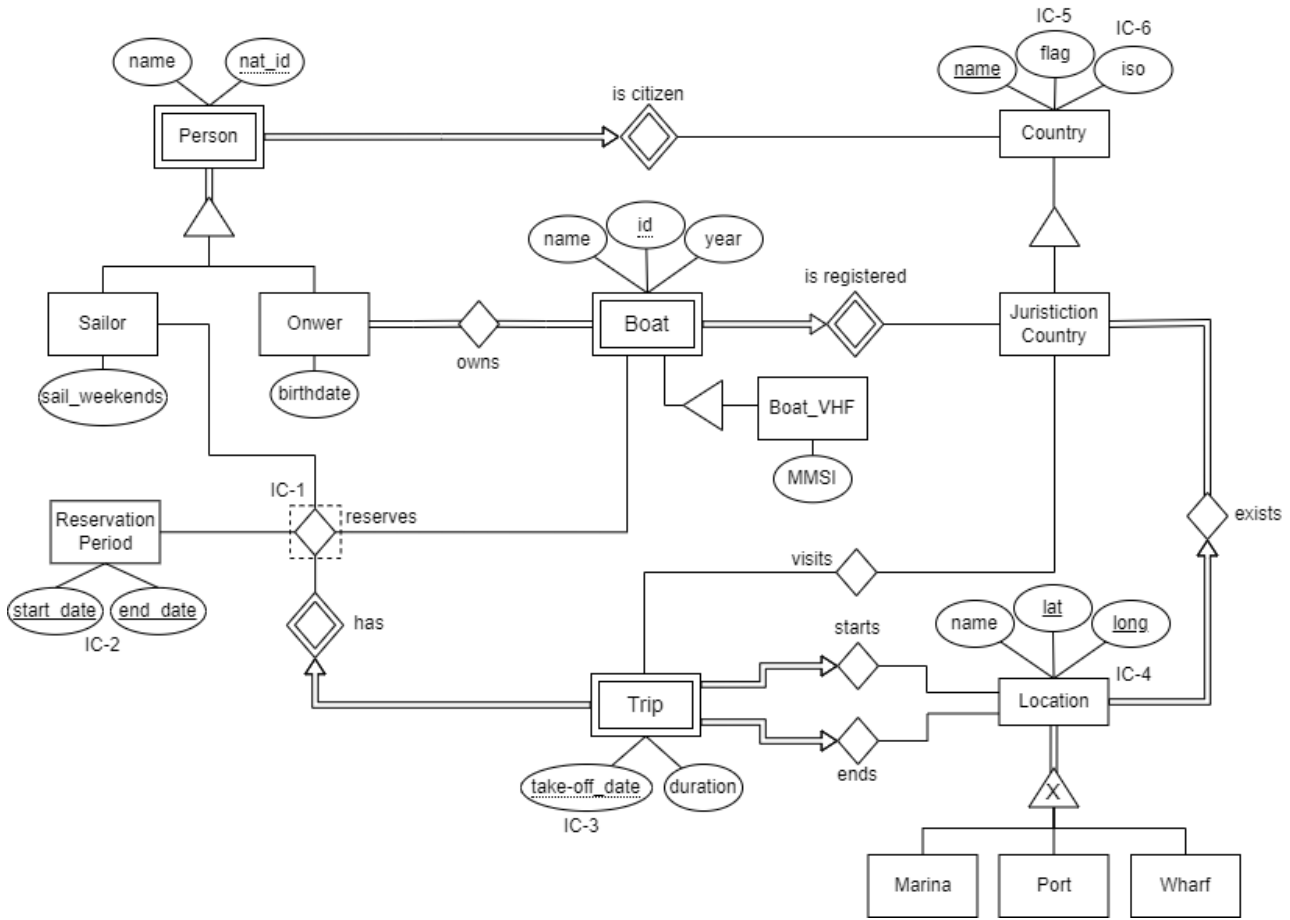


Figure 1: The Proposed E-A Model Diagram.

## 2 Integrity Constraints

Given that not all requirements stated in the project guide are satisfied by the diagram, due to some notation limitations, it is necessary to specify them in natural language. This way, these prerequisites are kept together so they are taken into consideration in latter stages, namely the implementation stage.

In the diagram of Figure 1, the symbol 'IC-n' (where n is the constraint identifier) is used to mark the elements that are affected by the following constraints:

- **IC-1:** A "Sailor" may only reserve a "Boat", if that "Boat" is not yet reserved for that "Reservation Period".
- **IC-2:** In a "Reservation Period", the end\_date must be later then start\_date.
- **IC-3:** The "Trip's" take-off\_date must be in between the "Reservation Period's" start\_date and end\_date.
- **IC-4:** Every "Location" must be at least 1 Nautical Mile (NM) apart.
- **IC-5:** The "Country" flag is unique.
- **IC-6:** The "Country" ISO is unique.

### 3 Designer Notes

As the project guide is not completely explicit, the following considerations were taken in the design of the model diagram:

- The access to the Boat's flag of registration and jurisdiction is made through the associations "is registered" and "visits", respectively. These associations have access to the flag through the "Jurisdiction Country" entity.
- One "Trip" may start and end in the same "Location" (e.g. circular trip);
- Given that not all countries have a maritime "Locations" in which they have jurisdiction upon, the model was design as such that "Jurisdiction Country" is a specialization of "Country". The entity "Country" is still considered in this database as it necessary to help identifying the nationality of each "Person".
- To make provide a more user friendly experience while reading the data base, the "Country's" name was chosen as primary key, as it is more easily readable and no sacrifice is made in terms of usability.
- Given that not all "Boats" have a fixed VHF radio, the model was designed as such that the "Boat\_VHF" is a specialization of "Boat", thus eliminating the necessity of NULL values like it would be if "MMSI" was an attribute of "Boat".
- Since the national ID of a "Person" is not a unique identifier worldwide and only nationally, this makes the entity "Person" a weak entity of "Country". In this database, multiple nationalities are not allowed, hence for those cases only the primary nationality (naturalality) should be recorded.
- In the database, "Country" doesn't need to have any recorded citizens as it may be only a "Jurisdiction Country" at a given moment.
- Reservations may or may not have any "Trip", as it is considered that is possible to reserve a "Boat" without wanting to travel, e.g. staying the night.