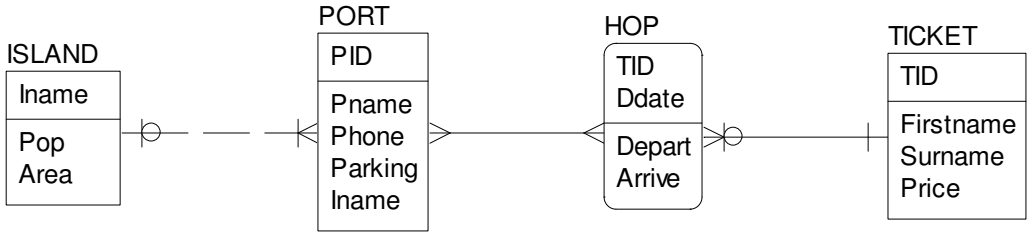
CS4123 Autumn 2016

Homework Assignment 8 Island Hopping

The ER diagram below represents a new type of advance-purchase ticket designed for island-hopping. This works a bit like an 'around the world ticket' but in a more limited geographical area. Each customer pays in advance (Price) for a Ticket which allows them to visit many islands within a given time period, arriving and leaving by specific ports on specific dates. Each 'hop' of the journey allows the ticket-holder to Depart from one particular Port on specified Ddate and Arrive at another specific Port. Each port in the scheme is identified by its PID and also has a name (Pname) and other attributes including its Phone number and the number of Parking spaces it has. Each island in the scheme is identified by its Iname and has a population (Pop) and an Area (in square metres). Other attributes are shown in the diagram and typical values of attributes can be found in the questions from Q4 onwards.



Q1

(a) Using the basic sets, **IDS, Numbers, Names, Dates** and **Money,** declare at least 8 specific **Domains** to model the data.

(b) Using your domains and the basic sets where required, write the Z record structure schemas for the Relations implied by the E-R diagram and the description above.

Q2

Write the State schema in Z for the **IslandFerries** database. Include all the existential and referential database integrity constraints.

Q3

Write an operation schema to insert into the database a tuple represented by the variable **t?** for the creation of a new Ticket. The TID must be unique.

Q4

Write an operation schema to insert into the database a tuple represented by the variable **h?** that allows a new Hop to be added to a customer's Ticket. Check that a valid ticket number is specified, that the identifier is unique and that both ports specified are valid.

Q5

Write an operation schema to modify an island's designated port. The old port identified by the domain variable **o?** is to be removed from the database and replaced by a new port represented by the tuple variable **n?** The island must already be in the database. There must be no ticket in the system with a Hop involving that port.