Teoria da Computação

MIEI 2018/2019 - FCT UNL

Aula Prática 3
Modelling with Sets and Logic

1. Consider a system that keeps track of the access permissions regarding a set of printers within a network. Consider that for each user there is a set printers that (s)he is allowed to use.

   (a) Model the set of states of the system with a set *APRINTER*.
   (b) Model (with a function or relation) the operation that checks if a user has access to a specific printer.
   (c) Model (with a function or relation) the operation that gives a user access to a printer.
   (d) Model (with a function or relation) an operation that returns the users that can access more printers.

2. Consider a system that keeps track of playlists. A playlist includes a name and a set of songs. Each song is defined by a title, an artist or band name, a duration, and a rating (1 to 5).

   (a) Model the set of states of the system with a set *SPLAYLIST*.
   (b) Model (with a function or relation) the operation that adds a song to a playlist.
   (c) Model (with a function or relation) the operation that removes a song from a playlist.
   (d) Model (with a function or relation) the operation that removes a song from all playlists.
   (e) Model (with a function or relation) the operation that given a song name returns the playlist names that include the song.

3. Model the following system with a structure.

   Consider a simplified version of $Google^+$ Circles where a user organizes friends using circles.

   A circle is simply a collection of users identified by a name.

   A user can be added to more than one circle.

   Assume that each user is identified by an email.

   (a) Model *SCIRCLE*, the set of states of the system.
   (b) Define (with a function or relation) the operation on *SCIRCLE* that adds a user to a set of circles.
   (c) Define (with a function or relation) the operation on *SCIRCLE* that retrieves all people in a circle.
   (d) Define (with a function or relation) the operation on *SCIRCLE* that blocks a user, i.e., deletes a user from all circles.
   (e) Define (with a function or relation) the operation on *SCIRCLE* that retrieves all the circles associated with a given user.

(f) Define (with a function or relation) the operation on *SCIRCLE* that given a user, retrieves its larger circle.

(g) Define (with a function or relation) the operation on *SCIRCLE* that given two circles names, retrieves the users that belong to the intersection.

(h) An extended circle of an user are its circle's circles, i.e. people who are at one degree of distance.

Define (with a function or relation) the operation on *SCIRCLE* that given a user, retrieves its extended circle.