Lab Assignment 2

CS 362 – Principles of Programming Languages II

Winter 2018

Problem

The goal of this lab is to implement quicksort in ML. The idea of quicksort was to pick a pivot element p, partition the input in elements smaller than p and elements larger than p, and then recursively sort both parts.

As pivot element, we will pick the median of the first, the middle, and the last element in a given list.

To implement quicksort, implement the following functions.

- A function `last(lst)` of type `'a list -> 'a` which returns the last element of a given list.
- A function `middle(lst)` of type `'a list -> 'a` which returns the middle element of a given list. Hint: One way implement this functions is to create a helper function which recursively call itself with one list reduced by one item and the other reduced by two item until the smaller list is empty.
- A function `median(a, b, c)` of type `'a * 'a * 'a -> 'a` which returns the median of the given three elements.
- A function `partition(lst, p)` of type `'a list * 'a -> 'a list * 'a list` which partitions the given list into a list containing all elements smaller than or equal to `p` and a list containing all elements larger than `p`.
- A function `quicksort(lst)` of type `'a list -> 'a list` which sorts a given list using quicksort and a pivot element as defined above.

Submission

Write your functions in a single `.sml`-file and upload it to canvas.

This is an individual assignment. Therefore, a submission is required from each student.

Deadline: Sunday, January 21, 11:59 pm.