

THE UNIVERSITY OF MELBOURNE
School of Computing and Information Systems

Declarative Programming
COMP90048

Semester 1

Project Specification

*Project due Thursday, 22nd March 2018 at 5pm
Worth 5%*

The objective of this project is to practice your Haskell programming skills. You will write a few fairly simple Haskell functions.

The Assignment

You will implement the following Haskell functions.

1. `elementPosition :: Eq t => t -> [t] -> Int`

`elementPosition` takes an element `elt` and a list `lst`, and returns the position of the first occurrence of `elt` in `lst`. That is, it returns the one-based index of the first occurrence of `elt` on `lst`. If `elt` does not appear in the list `lst` it should return 0. For example:

```
elementPosition 3 [1,2,3,4,5]    should return  3
elementPosition 'e' "elephant"   should return  1
elementPosition 'p' "elephant"   should return  4
elementPosition 'z' "elephant"   should return  0
```

2. `everyNth :: Int -> [t] -> [t]`

`everyNth` takes a number `n` and a list `lst` and returns a list of every `n`th element of `lst`, beginning with the `n`th element of `lst`. For example:

```
everyNth 4 "elephant"            should return  "pt"
everyNth 2 [2,3,5,7,11,13,17]    should return  [3,7,13]
everyNth 1 [2,3,5,7,11,13,17]    should return  [2,3,5,7,11,13,17]
everyNth 0 [2,3,5,7,11,13,17]    should report an error
```

3. `elementBefore :: Eq a => a -> [a] -> Maybe a`

`elementBefore` takes an element `elt` and a list `lst`, and returns `Just` the element immediately before the first occurrence of `elt` in `lst`, if it exists. For example:

```
elementBefore 3 [1,2,3,4,5]      should return  Just 2
elementBefore 'h' "elephant"     should return  Just 'p'
elementBefore 'z' "elephant"     should return  Nothing
elementBefore 'e' "elephant"     should return  Nothing
```

You must call your source file `Project1.hs` or `Project1.lhs` (note the capitalisation), and it must begin with the module declaration:

```
module Project1 (elementPosition, everyNth, elementBefore) where
```

I will post on the LMS a test driver program called `Project1Test` which is substantially similar to the test driver I will use for testing your code. I will compile and link your code for testing using the following command (or similar):

```
ghc -O2 --make Project1Test
```

Assessment

Your project will be assessed 100% on correctness. For this assignment, code quality will not be considered. However, for your own sanity, I do recommend commenting your code and programming it carefully, paying due attention to programming technique.

Note that timeouts will be imposed on all tests. Test cases will be rather small, so the timeouts should only affect you if you create an infinite recursion (infinite loop).

Submission

You **must** submit your project from either of the unix servers `dimefox.eng.unimelb.edu.au` or `nutmeg.eng.unimelb.edu.au`. Make sure the version of your program source files you wish to submit is on this host, then `cd` to the directory holding your source code and issue the command:

```
submit COMP90048 project1 Project1.hs
```

(or substitute `Project1.lhs` for `Project1.hs` if you are writing in literate Haskell).

Important: you must wait a minute or two (or more if the servers are busy) after submitting, and then issue the command

```
verify COMP90048 project1 | less
```

This will show you the test results from your submission, as well as the file(s) you submitted. If the test results show any problems, correct them and submit again. You may submit as often as you like; only your final submission will be assessed.

If you wish to (re-)submit after the project deadline, you may do so by adding `“.late”` to the end of the project name (*i.e.*, `project1.late`) in the `submit` and `verify` commands. But note that a penalty, described below, will apply to late submissions, so you should weigh the points you will lose for a late submission against the points you expect to gain by revising your program and submitting again.

It is your responsibility to verify your submission.

Your submission will be tested on one of the servers you are required to submit from. These servers run GHC version 7.0.4, which is probably older than the version you will develop on. You are advised to test your program on one of these servers before submitting; in the unlikely case that your program uses some Haskell features not supported by GHC 7.0.4, it will be much easier to discover this.

Note that these hosts are only available through the university's network. If you wish to use these machines from off campus, you will need to use the university's Virtual Private Network. The LMS Resources list gives instructions.

Windows users should see the LMS Resources list for instructions for downloading the (free) MobaXterm or Putty and Winscp programs to allow you to use and copy files to the department servers from windows computers. Mac OS X and Linux users can use the `ssh`, `scp`, and `sftp` programs that come with your operating system.

Late Penalties

Late submissions will incur a penalty of 0.5% of the possible value of that submission per hour late, including evening and weekend hours. Late submissions will incur a penalty of 0.5% per hour late, including evening and weekend hours. This means that a perfect project that is much more than 4 days late will receive less than half the marks for the project. If you have a medical or similar compelling reason for being late, you should contact the lecturer as early as possible to ask for an extension (preferably before the due date).

Note Well:

This project is part of your final assessment, so cheating is not acceptable. Any form of material exchange between teams, whether written, electronic or any other medium, is considered cheating, and so is the soliciting of help from electronic newsgroups. Providing undue assistance is considered as serious as receiving it, and in the case of similarities that indicate exchange of more than basic ideas, formal disciplinary action will be taken for all involved parties. If you have questions regarding these rules, please ask the lecturer.