Objectives

- (Practice) To gain experience using Scala's LazyList data type
- (Practice) To understand passing parameters using "call by name"
- (Theory) To understand that infinite lists are limits of sequences of partial lists
- (Theory) To understand Normal and Applicative Order Reduction strategies
- (Practice) To appreciate the evaluation order when using LazyLists

Resources

You should refer to the following resources accessible via Blackboard:

- Topic 9 Lecture videos 9A and 9B.
- Scala 2.13. Please note that the LazyList class is not available in versions of Scala lower than 2.13
- **Topic 9 folder** (zipped) – includes the notes and slides for this topic.
- External website for Scala doc and other **Learning Resources** (see the folder on Blackboard).

Introduction

Lazy evaluation allows the following benefits:

(1) Delayed evaluation. This can be useful in the context of "call by name" parameters to functions and methods. It can also be useful to use
lazy val *thing* = …
instead of
val *thing* = …
This delays the evaluation of *thing* until it is needed which can be useful if it is expensive and not needed for a particular run, for example.

(2) No need to compute more values than is necessary to perform a computation.

(3) Can represent "infinite" data structures. Although you don't ever want to evaluate an "infinite" structure, it can be useful to specify one and then evaluate a finite portion of it on demand. This approach can avoid the use of arbitrary limits.

Activities

3.1 Watch the videos

Watch the videos 9A and 9B. The accompanying slides can be found in the topic-9-folder.

3.2 Install and run the ListDemo program

Note: The examples in this topic use Scala's LazyList data type. This was introduced into the language at version 2.13.0 so any version later than this will work. When using IntelliJ go to the **build.sbt** file and change the Scala version, for example:

```
scalaVersion := "2.13.5"
```

NB: All the existing code in the project should still work with this new version. If you find that you have broken a file in which you used some syntax which has subsequently been deprecated then you may need to adapt that (either comment out the offending lines, or amend them). The IDE will suggest what to do.

Copy the Scala files **ListDemo5.scala** into the **demo.list** package. The exercises are embedded within these programs. Follow the instructions in the comments.