Programming Paradigms 2025
Session 10 : Functors

Preparing for the session

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Where nothing else is mentioned, chapters and page numbers refer to *Programming in Haskell*.

The video podcast

You can watch the podcast on YouTube via the course page on Moodle.

Tuesday 11 November 2025 – Functors

Please read Sections 12.1 and 12.2 of *Programming in Haskell*.

Learning goals for the session

- To understand the notion of a functor

- To understand how familiar type constructs such as Maybe types and lists can be instances of the type class Functor

- To understand the notion of applicative functors

- To understand the pure and <∗> operations and how they can be used in the applicative style of programming in Haskell

- To be able to apply the notions of functors and applicative functors for writing well-structured Haskell programs

How you should prepare before we meet on Tuesday

Before we meet, watch the podcast and read the text. You can do this in any order you like. Also see if you can solve the following two small discussion problems. We will talk about them in class.

1. An onion consists of a finite number of layers surrounding a core. In this problem, we let the core be a value. Figure 0.1 shows an onion with six layers and core "bingo". Below is a declaration of an algebraic datatype Onion a parameterized by the type a.

Figure 0.1: An onion whose core is the value bingo

data Onion a = Core a | Layer (Onion a)

Define Onion as an instance of Functor. *Hint:* Be inspired by how the book shows how one can let the Tree type become an instance of Functor.

2. Check that the first two applicative laws at the top of page 163 hold for the Maybe type. *Hint:* Use the definitions of pure and <∗> on page 160.