Principles of Programming Languages 2-0-3

Course Overview

About Course

This course provides a quick overview of different paradigms of programming languages. It focuses primarily on the **functional programming paradigm** using **Haskell** and **Scala** and discusses the **concurrent programming paradigm** using **Java**.

Syllabus Overview

Unit I (Haskell)

Programming Paradigms Overview of different programming paradigms. Functional Programming with Haskell functions and types, functional composition, numbers, lists, tuples, type classes, pattern matching, higher order functions: currying, lambdas, maps and filters, folds, IO monad

Syllabus Overview

Unit II (Scala)

Functional Programming overview with Scala Basic types and operations, classes and objects, functional objects, functions and closure, composition and inheritance.

Syllabus Overview

Unit III (Java)

Concurrency in Java - Issues with concurrency: safety, liveness, fairness, Threads, locks and synchronization, Thread pools, Futures and callables, fork-join parallel framework

Course Outcome

- Understand and write pure functional programs (especially in Haskell and Scala).
- Understand and write concurrent programs in Java.
- Formulate abstractions with higher order procedures.
- Formulate abstractions with data.

Evaluation Plan

Assessment	Internal	External
Mid Term Exam	20	
Continuous Assessment -Theory (CAT)	10	
Continuous Assessment -Lab (CAL)	40	
End Semester		30

*CAT
Quiz (best 2 out of 3) – 5+5 =10

*CAL
Lab Evaluations – 10
Lab Exams (2) – 10+10 =20
Lab Report - 10

Tools and Environment for Lab

- Preferred Ubuntu
  - GHC: the Glasgow Haskell Compiler – Link
  - Java Software Development Kit(SDK)
  - Scala for Linux - Link

- Online Editors
  - https://onecompiler.com/ (Haskell, Scala, Java)
  - https://www.jdoodle.com/ (Haskell, Scala, Java)