Caml, Ocaml, Jocaml

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Caml is the version of Robin Milner's ML language developed at INRIA by Xavier Leroy et al. To be short, ML = Lisp + strong typing. Types in ML are polymorphic with a powerful type inference system. Caml is now the most popular programming language for implementing theorem provers. It is also used in programs for machine learning, mathematics for finance and web applications.

This course is built on a sequence of examples illustrating the power of the language. All classes will correspond to programming exercices. This course might motivate students to functional programming (with languages such as Caml, F#, SML, or Haskell) and to languages with a strong typing discipline (Java, C#, or Scala). Synchronization by Join patterns has been implemented inside Visual Studio for C and Visual Basic.

Basics of Caml	
Thursday 14:00-16:00, 11/19, FIT 1-515	functional programming: functions, closures, recursive data types, polymorphic types
Friday 09:00-11:00, 11/20, FIT 1-515	imperative features: references, mutable data, i/o's [list processing, tree traversals]
Thursday 14:00-16:00, 11/26, FIT 1-415	standard library [labeling program for bitmap graphics]
The duality between Modules and Objects in Ocaml	
Friday 09:00-11:00, 11/27, FIT 1-415	modules, signatures, parametric modules, private variables, abstract types. Objects in Ocaml [examples of subtyping in graphics and user interfaces]
Concurrent programs and remote invocation of functions in Jocaml	
Thursday 14:00-16:00, 12/03, FIT 1-515	standard multithread programming (Linux threads) for shared memory architectures
Friday 09:00-11:00, 12/04, FIT 1-415	concurrency in distributed applications, join-patterns [example of small games and a distributed ray tracing program]

- Books on Caml:

  - Le langage Caml, Pierre Weis and Xavier Leroy (in French), InterEditions, 1993
  - The Functional Approach to Programming, Guy Cousineau and Michel Mauny, CUP 1998.

- Books and Tutorial on Ocaml:

  - www.ocaml-tutorial.org/ (partly in chinese)
  - Introduction to Objective Caml: www.cs.caltech.edu/courses/cs134/cs134b/book.pdf
  - Developing Applications With Objective Caml: caml.inria.fr/pub/docs/oreilly-book/
  - Ocaml for Scientits: www.ffconsultancy.com/products/ocaml_for_scientists/

- Documentation on Jocaml:

  - Info and Tutorial at jocaml.inria.fr
  - Milner's book: Communicating and Mobile Systems: The Pi-Calculus, CUP, 1999