Virtual Machines
Lecture 1 - Introduction

Website

http://www.cs.ubbcluj.ro/~craciunf/

MasiniVirtuale

Course Objectives

1. To learn functional programming using a real-world language --OCaml
2. To learn how to design and implement a compiler
3. To learn how to design and implement the analyses and verifications inside a compiler

Course Overview

The course consists of two main modules:

- Module 1: Learning Ocaml language
- Module 2: Design and Implement the Static Analyses and Verification Techniques from a Compiler

Module 1 Overview

It consists of about 3-4 lectures and covers the following topics:

- Variables and Functions
- Lists and Patterns
- Files, Modules and Programs
- Records
- Variants
- Error handling
- Imperative Programming
- Functors and First-Class Modules

Module 2 Overview

It consists of about 6 lectures and covers the following topics:

- Program Intermmediate Representation: AST, CFG (1st assignment)
- Lexical and Syntactical Analyses(2nd assignment)
- Static analysis principles
- Type Systems (3rd assignment)
- Dataflow analyses and optimizations (4th assignment)

Labs

- Project assignments discussion, implementation and evaluation
- Course materials discussion
- Each student must do a short oral presentation of her/his final graduate project

- Evaluation:
  - Labs activity (90%):
    - Group of 1 or 2 students : same project consisting of 4 assignments (70%)
    - Oral presentation of your final graduate project (10%)
  - Individual Final exam (open book) (20%)

Until next lecture Wednesday 2nd March 2016 please email me your groups (your names and emails)

- **craciunf@gmail.com**

Course Rules:

- You must submit all the seminar assignments at the established deadlines
- If you delay your seminar assignments, each delayed week means a -1points penalty
- For an unsubmitted assignment you get the grade 1.
- The final exam is open book and will be in the last week
- In the “restanta” exam, in addition to the final exam you have to present all assignments that you have not submitted during the course.

References

Ocaml:

- https://ocaml.org/docs/
- https://realworldocaml.org/v1/en/html/index.html

Static Analysis:

- F.Nielson, H.R.Nielson, C. Hankin: Principles of Program Analysis, Springer Verlag, 2004
- Other research papers that will be made available with the lecture notes

Ocaml installation

- https://ocaml.org/docs/install.html
- Windows: https://www.typerex.org/ocpwin.html

Windows: editor https://www.typerex.org/ocaml-top.html

Ocaml language

https://realworldocaml.org/v1/en/html/index.html

This lecture Chapter 1 (see attached Chapter1.pdf)