Nature of Programming Languages

Topic 0. Course overview

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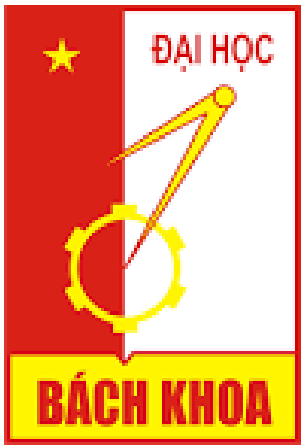


Faculty of Mathematics and Informatics
Hanoi University of Science and Technology

Outline

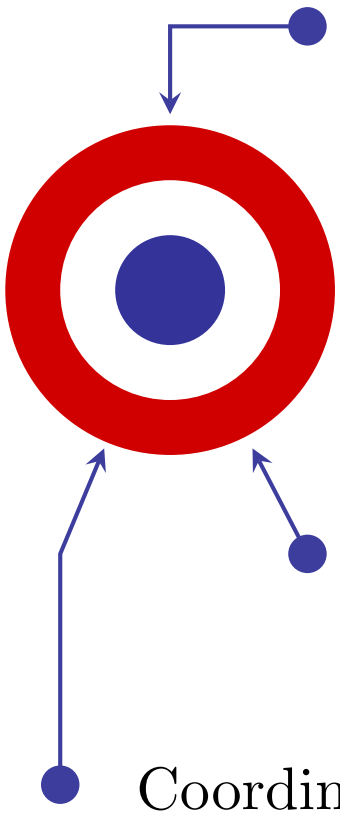
1. Introduction to the course CS3370

1.1. Course purpose

- This is a required major course in Troy Computer Science Program at HUST. The course provides fundamental and essential concepts of programming languages and paradigms. Its main focus will be on underlying principles of programming language design and implementation. The practice part of the course allows students to work with various modern programming languages used for demonstration of the involved concepts and principles
- To conform with the ACM/IEEE-CS/AAAI competency-based Computer Science Curriculum 2023, the course itself serves as a foundation course of programming languages. Therefore, it will help students in their further study and future profession

1.2. Course objectives

After completing this course, you will be able to:



- Master fundamental concepts that underlie programming language syntax and semantics
- Gain insight into problem of designing new programming languages
- Understand benefits of and be able to program in different programming languages
- Understand benefits of and be able to apply appropriate programming paradigms to software development projects
- Coordinate a programming language design and implementation project and work with other team members to build deliverables along the way

1.3. Course content

This course covers key selected topics as foundations of programming languages including:

- General introduction
- Language design criteria
- Imperative programming
- Functional programming
- Logic programming
- Object-oriented programming
- Syntax
- Basic semantics
- Data types
- Expressions and statements
- Procedures and environments
- Abstract data types and modules

1.4. Learning materials

1. Kenneth C. Louden and Kenneth A. Lambert (2011) *Programming Languages: Principles and Practice*. Third Edition. Cengage Learning
2. Robert Harper (2016) *Practical Foundations for Programming Languages*. Second Edition. Cambridge University Press
3. Kent D. Lee (2017) *Foundations of Programming Languages*. Second Edition. Springer International Publishing AG
4. John M. Zelle (2017) *Python Programming: An Introduction to Computer Science*. Third Edition. Franklin, Beedle & Associates Inc
5. Ray Toal, Rachel Rivera, Alexander Schneider and Eileen Choe (2017) *Programming Language Explorations*. Taylor & Francis Group, LLC

2. Projects and assignments

Individual project and assignments

1. Quiz
2. Homework
3. Oral presentation

Group project

You are required to work in a group of three to five students. Your group will investigate the creation or realized application of a programming language other than C/C++, Java, Python, ML, Prolog and Ada. Depending on the language of your choice, you have to demonstrate your ability in the language design or in using the language's features

3. Your first project

3. Your first project

Students work individually to carry out the following tasks:

1. Find and make a list of your favorite programming languages
2. For each language in your list, learn (if necessary) and then teach us how to write and run a Hello World program
3. Give a brief introduction (its purpose, strengths and weaknesses) to the programming language that you think it is most important for your future career
4. Share your programming experience (e.g. courses taken, certificates, software development projects, languages design and implementation, etc.)
5. Submit results of tasks $1, 3$ and 4. The submission link will be sent to you on completion

Course overview

Thank you very much for your attention!