Programming Paradigms

CT331 Lecture 1

Finlay Smith

finlay.smith@universityofgalway.ie

School of Computer Science

Course Outline

Lectures:	2/week | Fridays 9-11AM
Labs:	2/week | Thursday 2-4pm

Course Outline

Topics: Introduction

Object Oriented Programming Overview of concepts

Procedural Programming with C

Functional Programming with Scheme, Lisp

Logical / Declarative Programming with Prolog

Course Outline

Grading:	Exam	70%
	Assignments	30%

Exam is a required component

Paradigm...

Dictionary

paradigm

paradigm

/ˈparədʌɪm/

noun

1. a typical example or pattern of something; a pattern or model.
   "society's paradigm of the 'ideal woman'"
2. LINGUISTICS
   a set of linguistic items that form mutually exclusive choices in particular syntactic roles.
   "English determiners form a paradigm: we can say 'a book' or 'his book' but not 'a his book'"

Programming Paradigm

A pattern or model of programming.

Programming Paradigms

Conceptual … various types of programming languages are better suited to solving particular problems.

Examples:

- C
- Java
- Python
- Prolog

Programming Paradigms

Implementations differ:

Semantics …

Syntax …

```
system.out.println(“Hello world!”);

printf(“Hello world!”);
```

```
2 + 3

add (2,3)

(+ 2 3)
```

Syntax / Semantics

Syntax refers to the rules of the language; allows us to form valid expressions and statements

Semantics refers to the meaning of those expressions and statements

Programming Paradigms

Programming languages can be classified according to features they have with respect to conceptual and implementation level.

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Programming paradigms:

Essentially, a collection of abstract features that categorise a group of languages.

(either definition is correct)

Programming Paradigms

The popularity of a paradigm is due to one community deciding which problems are important to solve and then supporting the most promising paradigm for attacking these problems.

- Thomas Kuhn

Influences on paradigms 1/3

Computer Capabilities

Vacuum tubes to transistor circuits to integrated circuits to microcomputers to PCs to LANs to networking to massively parallel architectures to…

Applications

Scientific, business and industrial applications, computer games, PC software, business, telecommunications, android/iphones ….

Influences on paradigms 2/3

Programming Methods

Language designs have evolved to reflect changing understanding of good methods for writing large and complex programs.

Implementation Methods

Early compilers to optimised compilers; structured engineering to software engineering; data abstraction to OO

Hand written assembly code is slower than compiled C – WHY?

Influences on paradigms 3/3

Theoretical Studies

Formal maths methods have deepened understanding of strengths and weaknesses of language features and thus influenced the choice and inclusion of those features.

Standardization

Has proved to be a strong conservative influence on the evolution of programming language design.

"There are two ways of constructing a software design. One way is to make it so simple that there are obviously no deficiencies. And the other way is to make it so complicated that there are no obvious deficiencies."
– C.A.R. Hoare

“Everyone knows that debugging is twice as hard as writing a program in the first place. So if you're as clever as you can be when you write it, how will you ever debug it?”
– Brian Kernighan

Reference Material

https://racket-lang.org/

http://www.swi-prolog.org/