19CSE201 :Advanced Programming

Lecture 1
Introduction

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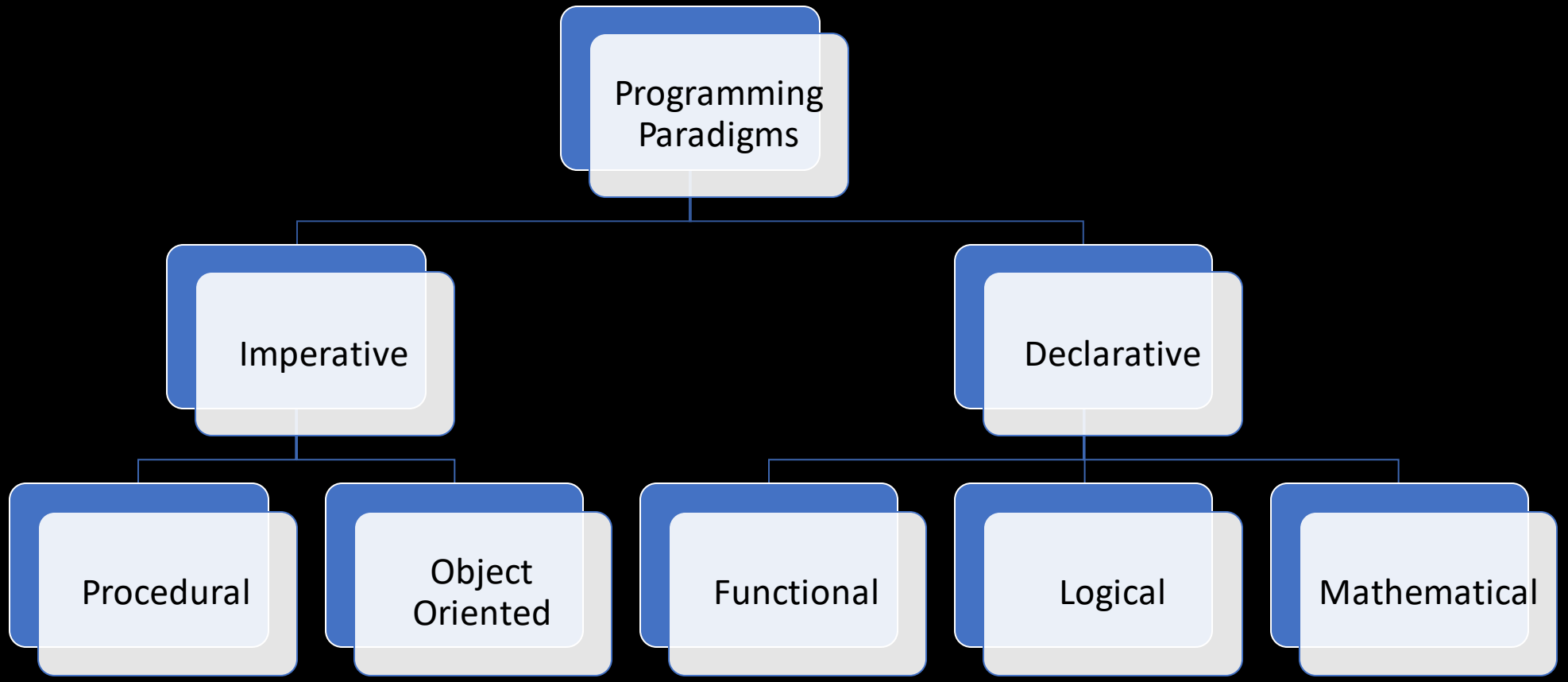
How do programming languages differ?

- Common Constructs:
  - basic data types (numbers,etc.);
  - variables;
  - expressions;
  - statements;
  - keywords;
  - control constructs;
  - procedures;
  - comments;
  - errors …

So which is better? Why??

- Uncommon Constructs:
  - type declarations;
  - special types (strings,arrays, matrices,…);
  - Sequential execution;
  - concurrency constructs;
  - packages/modules;
  - objects;
  - general functions;
  - generics;
  - modifiable state;…

Programming Paradigms



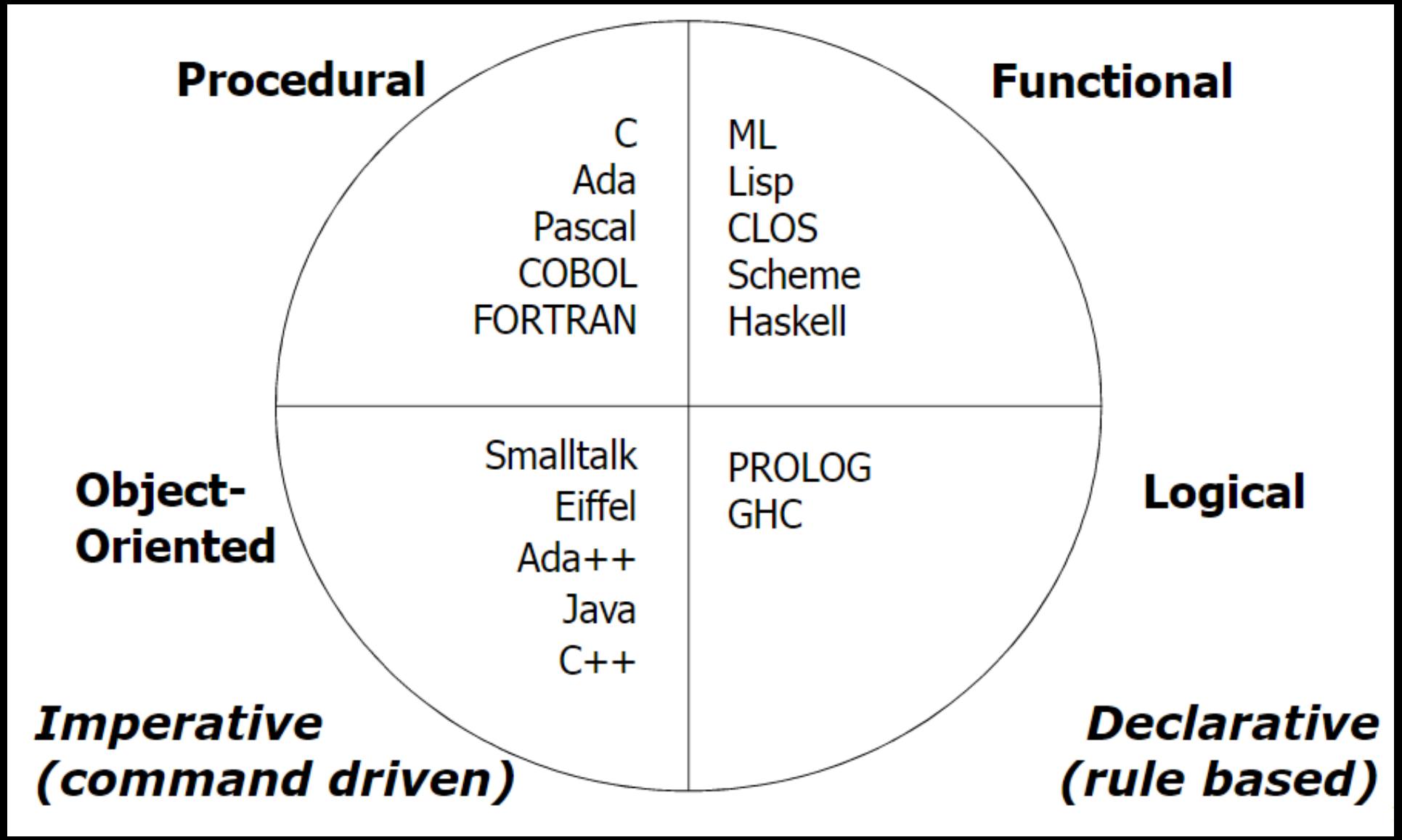
source: Nørmark, Kurt. Overview of the four main programming paradigms. Aalborg University, 9 May 2011. Retrieved 22 July 2020

Imperative paradigm

- Procedural and object-oriented programming belong under imperative paradigm. Eg. Languages like C, C++, C#, PHP, Java and of course Assembly.
- Code focus is on creating statements that change program states by creating algorithms that tell the computer how to do things. It closely relates to how hardware works.
- Typically the code will make use of conditional statements, loops etc..

Declarative paradigm

- Logic, functional and domain-specific languages belong under declarative paradigms and they are not always Turing-complete (they are not always universal programming languages). Examples would be HTML, CSS, SQL, Prolog, Haskell, Lisp etc.
- Declarative code focuses on building logic of software without actually describing its flow.
- You are saying '*what*' without adding '*how*'. For example with HTML you use to tell browser to display an image and you don't care how it does that.



So What about mathematical Programming?

- Source: Christofides Vassilis, CS-252 Fall 2012

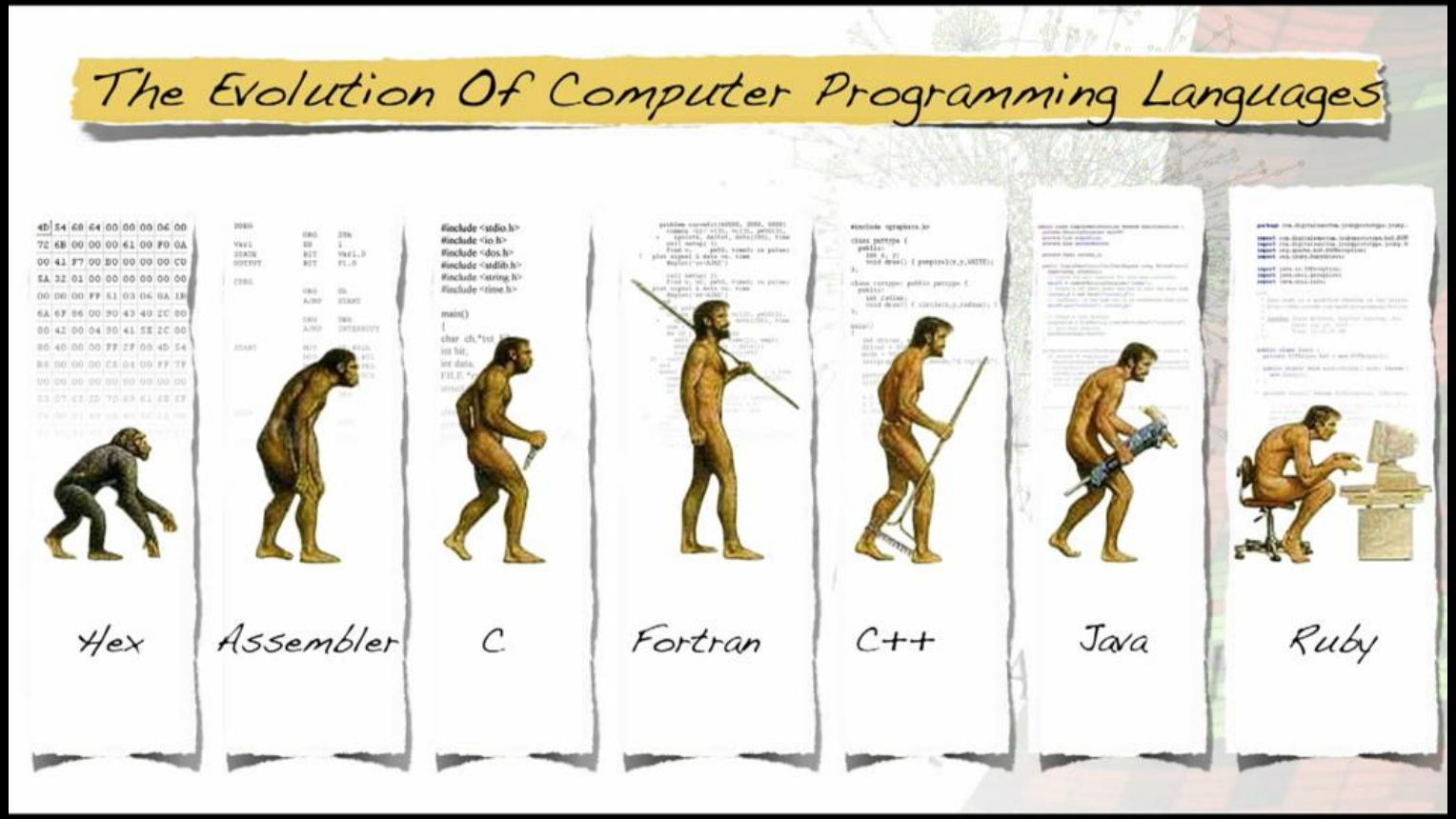
A programming language is a problem-solving tool

Paradigm	Style	Purpose	Example	Language
Procedural	program =algorithms + data	good for decomposition	If(a>0) printf("5");	C
Functional	program =functions (functions)	good for reasoning	(if (positive? -5) (error "doesn't get here") 2)	Scheme
Logical	program =facts + rules	good for searching	(X =< Y -> Z = Y ; Z = X). Max of 3 nos	Prolog
Object Oriented	program =objects + messages	good for hiding	If(a>0){ cout<<"5";}	C++

- Other styles and paradigms: blackboard, pipes and filters, constraints, lists, etc.

Why So Many Programming Languages?

1. Evolution – Things improve over time



Pic source: https://xrds.acm.org/images/4833512699_761a3fcc61_b.jpg

Why So Many Programming Languages?

2. Socio-Economic Factors

- New Infrastructures

Pic source: https://encrypted-tbn0.gstatic.com/images?q=tbn%3AANd9GcSr7suj5Ai2VtIYj7smICC3UoQoFmqVk9rDlQ&usqp=CAU

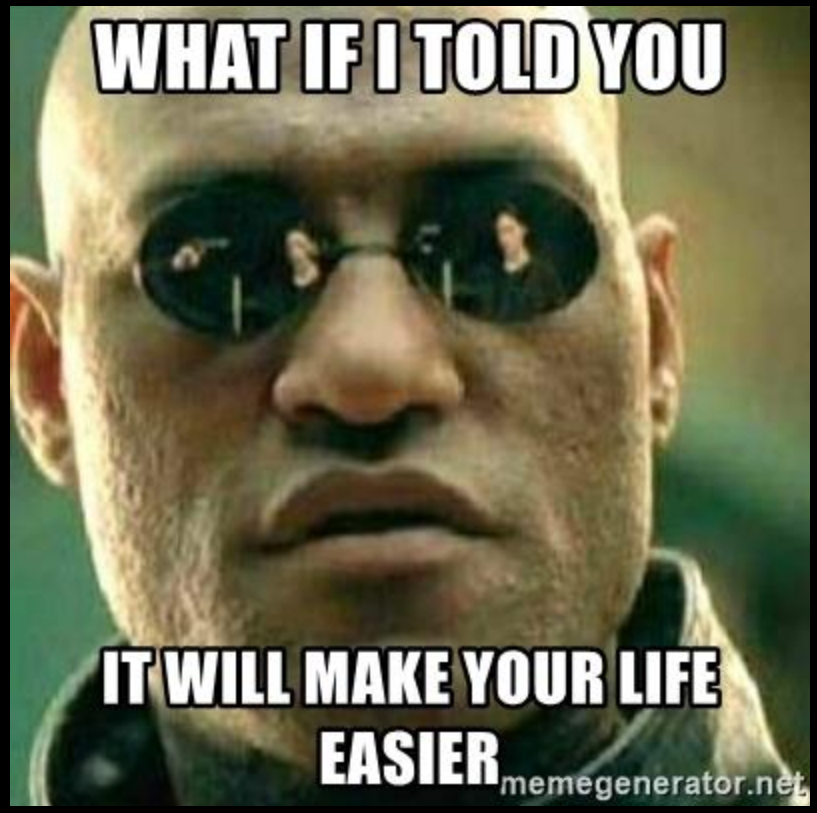
Why So Many Programming Languages?

3. Proprietary Interests / Commercial aspects

Pic source: https://s3.amazonaws.com/lowres.cartoonstock.com/business-commerce-copyright-business_meetings-lawyer-lawyers-attorneys-cwln1923_low.jpg

Why So Many Programming Languages?

4. Different views on what is "easier"



Pic source: https://memegenerator.net/img/instances/66765258/what-if-i-told-you-it-will-make-your-life-easier.jpg

Top Programming Languages of 2020

Sources:

1. https://spectrum.ieee.org/at-work/tech-careers/top-programming-language-2020
2. https://www.tiobe.com/tiobe-index/

Up Next

Hello World!