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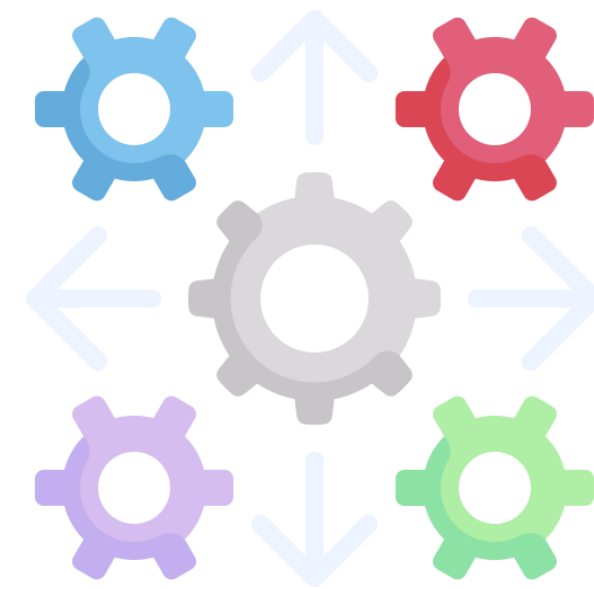
# Environment Setup OOP Intro and Basics

Object-oriented Software Development  
SE 350– Spring 2021

Vahid Alizadeh



Week 1.2  
April 1, 2021



# Environment Setup

## JDK and IDE

# Why Java?

## ■ What is Java Programming?

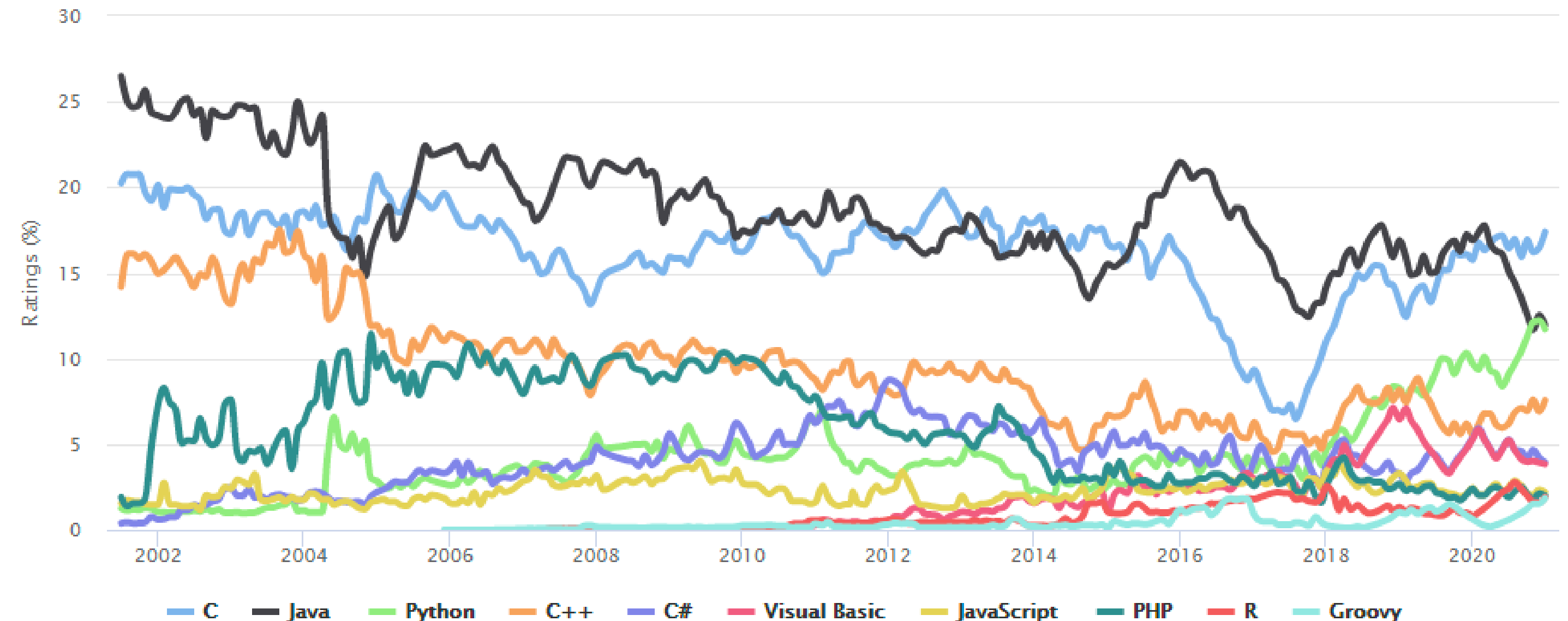
- Ecosystem
  - Java Development Kit (**JDK**)
  - Java Runtime Environment (**JRE**)
  - Integrated Development Environment (**IDE**)
- Started 1990 | SUN Microsystem
  - Oak >> Java
  - Better version of C++
  - Java 1.0 (1996) >> Opensource (2006)
  - Oracle Corporation purchased Sun Microsystems (2010)
  - Latest version: Java 15 (2020)

## ■ Benefits of programming in Java

- Object-oriented programming
- High-level language
- Platform-independency (Write Once Run Anywhere)
- Automatic memory management
- Stability and massive community
  - <https://insights.stackoverflow.com/survey/2020>



"Java Logos Throughout the Time"



TIOBE Index – January 2021

<https://www.tiobe.com/tiobe-index/>

# Programming Environment

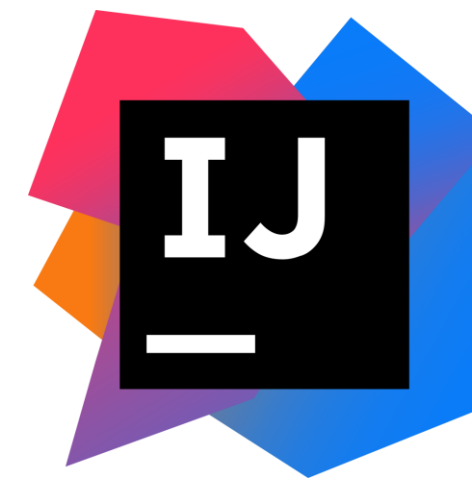
## ■ JAVA IDE

- Desktop Apps

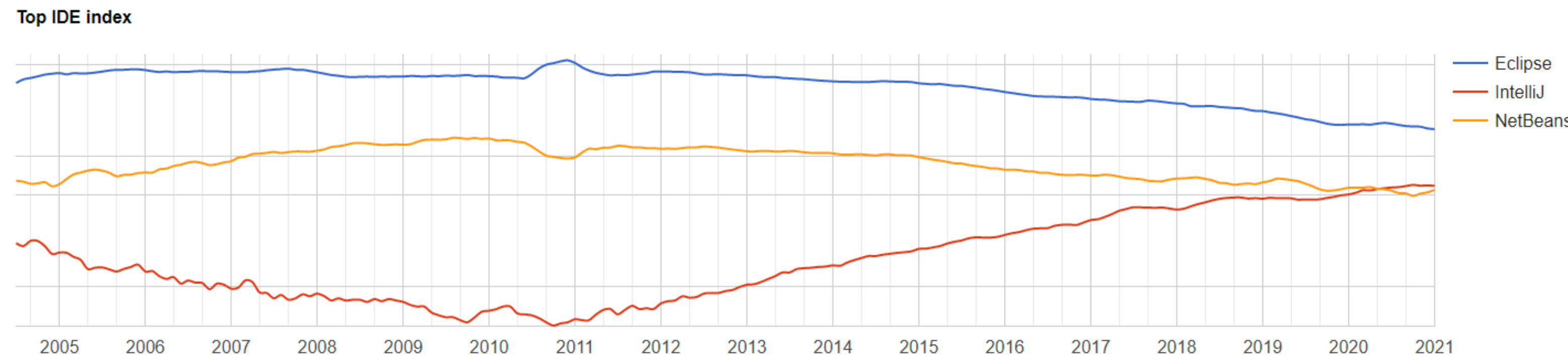
- <https://www.jetbrains.com/idea/>
- <https://www.eclipse.org/>
- <https://netbeans.org/>

- Online Apps

- <https://repl.it/new/java10>
- <https://www.compilejava.net/>
- <https://www.codiva.io/>
- <https://www.jdoodle.com/online-java-compiler/>
- <https://www.browxy.com/>
- [https://www.onlinegdb.com/online\\_java\\_compiler](https://www.onlinegdb.com/online_java_compiler)
- <https://paiza.io/en/projects/new?language=java>
- <https://ideone.com/>



Worldwide, Visual Studio is the most popular IDE, Visual Studio Code grew the most in the last 5 years (8.3%) and Eclipse lost the most (0.2%)



<https://pypl.github.io/IDE.html>

# Programming Environment

## Basic Terms & Installations

- JVM
  - Interpreting “.class”
- JRE
  - JRE=JVM+ some packages
- JDK
  - JDK=JRE+ development tools
- Bytecode
  - JVM Machine Language
- Platform
  - Where the program runs
- JVM, JRE, and JDK are platform dependent, but Java is platform independent.
- IDE

## Download JDK:

- <https://www.oracle.com/technetwork/java/javase/downloads/index.html>

## Oracle JDK vs Open JDK

- <https://www.baeldung.com/oracle-jdk-vs-openjdk>

	JDK 8			JDK 11		
Binaries	Available for download	Free in production	Free Updates after Jan 2019	Available for download	Free in production	Free updates
Oracle JDK	Yes	Yes	No	Yes	No	Yes
Oracle Open JDK	Yes	Yes	No	Yes (not LTS)	Yes	Yes (until JDK 12)
AdoptOpenJDK	Yes	Yes	Yes	Yes	Yes	Yes
Amazon Correto	Yes	Yes	Yes	Yes	Yes	Yes
Sapmachine	Yes	Yes	Yes	Yes	Yes	Yes
Red Hat OpenJDK	Yes (For RHEL and Windows)	Yes	Included in RHEL/Windows Middleware	Yes	Yes (For RHEL and Windows)	Included in RHEL / Windows Middleware
Zulu	Yes	Yes	With Zulu Enterprise	Yes	Yes	With Zulu Enterprise
IBM OpenJDK	Yes	Yes	Yes	No	-	-





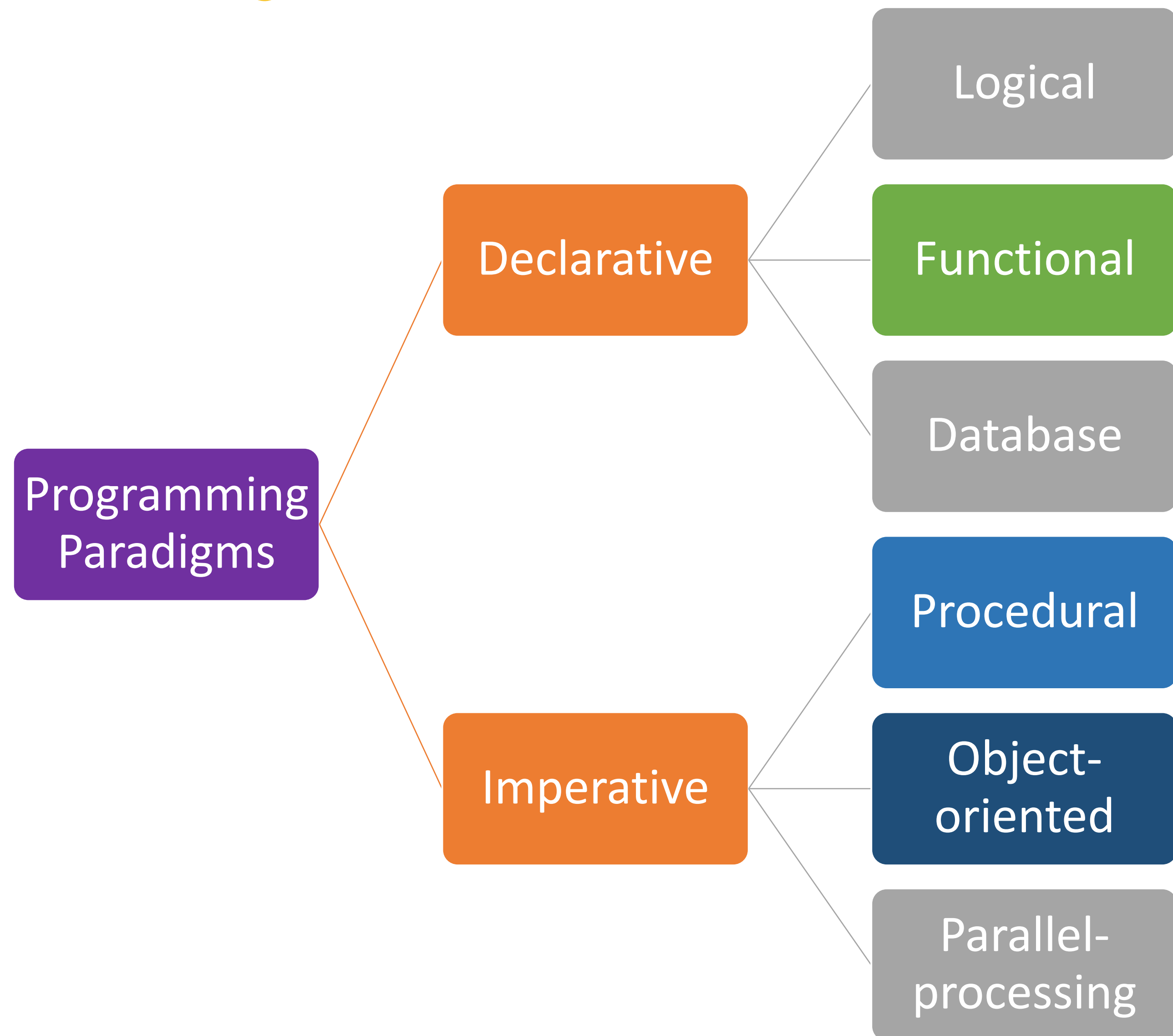
# Programming Paradigms

## Categories of programming styles

# Programming Paradigms

## ■ What is Programming Paradigm?

- Imperative
  - **HOW** to execute program logic
- Declarative
  - **WHAT** to execute



# Imperative Programming



- **How to execute program logic**
- **Defines control flow as statement**
  - Explicit
- **Language examples:**
  - Procedural
    - C, Pascal
  - Object oriented
    - C++, Java, PHP, Python, Ruby
  - Parallel processing
    - NESL



```
int total = 0;  
int number1 = 5;  
int number2 = 10;  
int number3 = 15;  
total = number1 + number2 + number3;
```



# Declarative Programming



- What to execute

- Defines program logic

- Explicit

- Language examples:

- Logic
  - Prolog
- Functional
  - Scala, Lisp, Julia, Haskell, R, Matlab
- Database/Data driven
  - SQL

```
WITH patient_data AS (  
    SELECT patient_id, patient_name, hospital, drug_dosage  
    FROM hospital_registry  
    WHERE (last_visit > now() - interval '14 days' OR last_visit IS NULL)  
    AND city = "Los Angeles"  
)  
  
WITH average_dosage AS (  
    SELECT hospital, AVG(drug_dosage) AS Average  
    FROM patient_data  
    GROUP BY hospital  
)  
  
SELECT count(hospital)  
FROM average_dosage;  
WHERE AVG(drug_dosage) > 1000
```

# Procedural Programming



## ▪ Top to bottom

## ▪ Features of Procedural Code

- general-purpose programming
- Simplicity of code and implementation
- Various learning resources
- Portable code / reusability
- Easy to read and track

```
program Fibonacci;

function fib(n: Integer): Integer;
var a: Integer = 1;
    b: Integer = 1;
    f: Integer;
    i: Integer;
begin
    if (n = 1) or (n = 2) then
        fib := 1
    else
        begin
            for i := 3 to n do
                begin
                    f := a + b;
                    b := a;
                    a := f;
                end;
            fib := f;
        end;
    end;

begin
    WriteLn(fib(6));
end.
```

# Functional Programming



## ▪ Evaluating math functions and avoid mutable data.

## ▪ Classification of functions:

- Pure
- Impure
- Higher Order
  - Accept other functions as arguments
  - Or returns a function as a result

```
//Pure Function
public class PureFunction{
    public int sum(int a, int b) {
        return a + b;
    }
}

//Non pure function
public class ImpureFunction{
    private int value = 0;

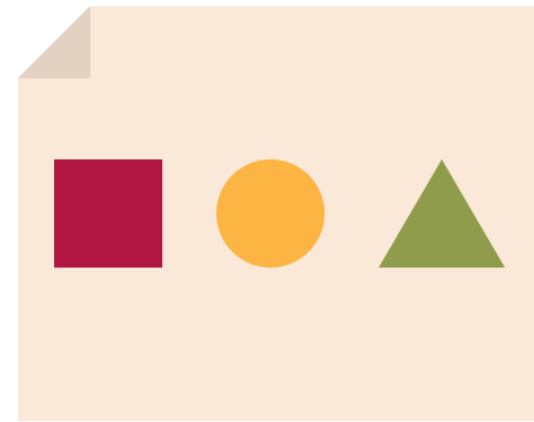
    public int add(int nextValue) {
        this.value += nextValue;
        return this.value;
    }
}

//Higher Order
List<String> names = Arrays.asList("Madan", "Meenakshi", "Manya");
Collections.sort(names, (first, second) -> first.length() - second.length());
```

# What was the first programming language you learnt?

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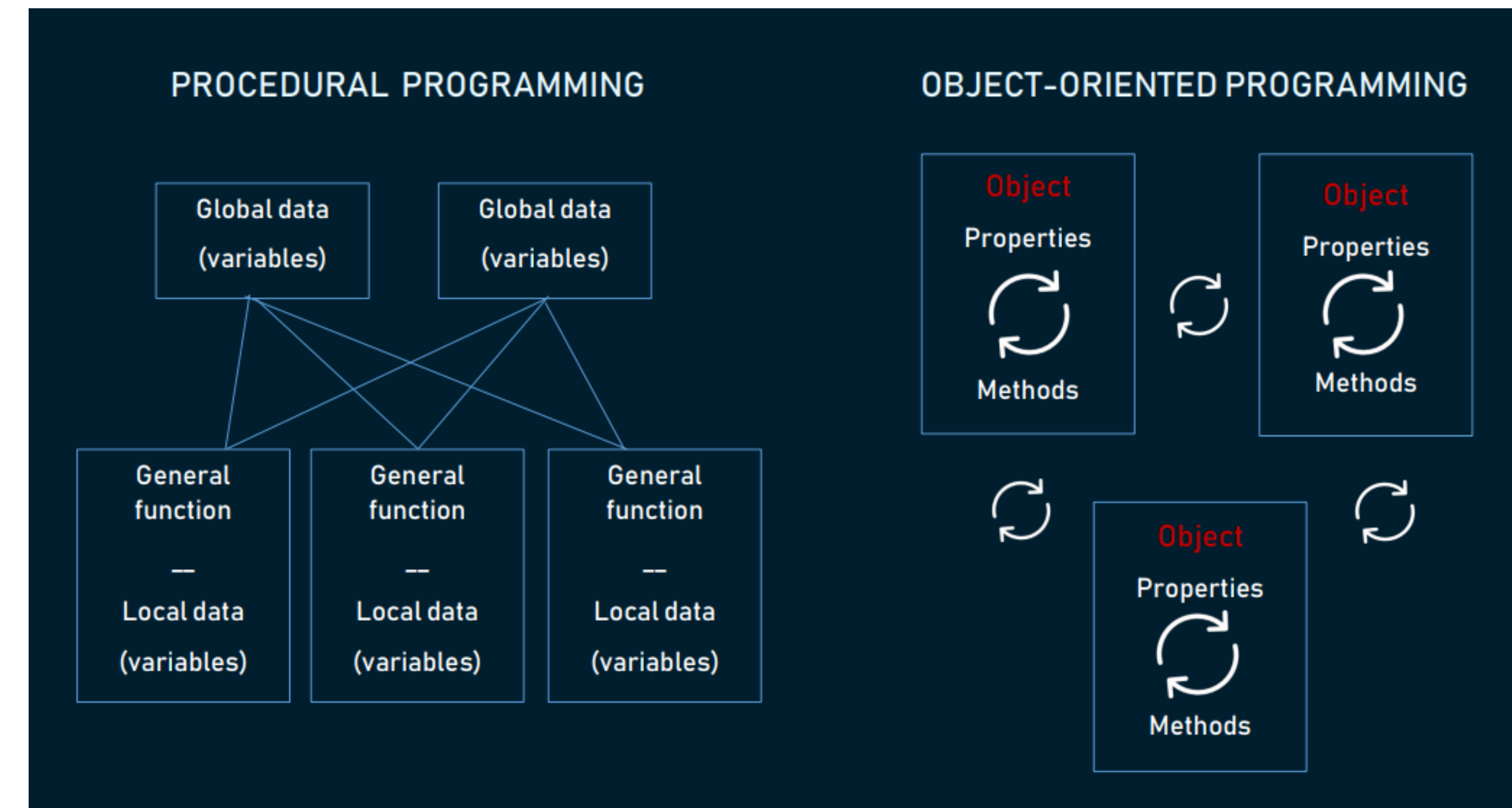
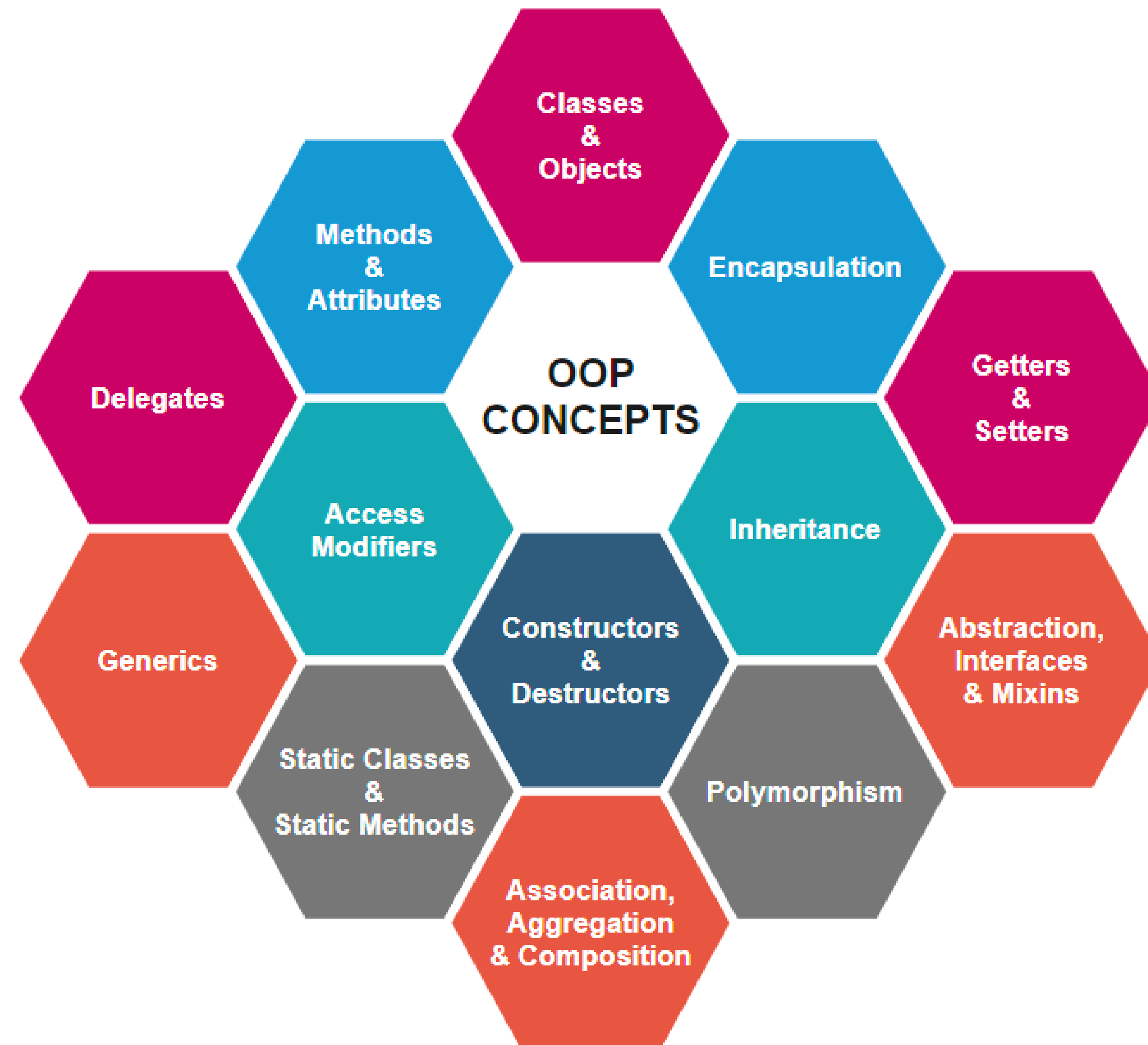
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# Object-oriented Programming

## Introduction & Basics

# Object-oriented Programming







**Any Question**

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# How do you feel about the course?



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