Kabul Polytechnic University
Computer Science Faculty
Information System Department

Design Patterns

Lecture 0: Course Overview

01 September – 2024

Lectures & other related materials are available here: *https://github.com/mujtabaSultani01/design_patterns*

Contents

▸ Class Policies and Organizational Issues

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▸ Organizational Issues

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▸ Course Materials

▸ Introduction to the Topic

  ▸ Why design patterns?

  ▸ Design patterns definitions

  ▸ What is the use of design patterns?

  ▸ Why are design patterns so popular?

  ▸ …

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Course Information

‣ **Course Name:**

  ‣ Design Patterns

‣ **Pre-Requirements for the participation**

  ‣ *Software Development using any programming languages such as Python, C#, Java or C++.*

  ‣ *Knowledge of basic software design using UML diagrams.*

‣ **Type of Course:**

  ‣ Lecture with supporting weekly exercises to repeat and adapt the lecture contents and Projects.

‣ **Slides and Extra Notes:**

  ‣ Soft Version, available here: *https://github.com/mujtabaSultani01/design_patterns*

Lecture Issues

▸ Lecture Times per Week

  ▸ Sunday 08:00 – 09:45 (Lecture)

  ▸ Monday 09:45 – 11:20 (Lecture)

▸ Office hours

  ▸ Sunday   10:00 – 01:00

  ▸ Wednesday 08:00 – 01:00

▸ Private appointment

  ▸ Contact me through email.

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Assignments

- Weekly basis

- Rules

  - ✓ The Assignments should be handover Before the deadline...
  - ✓ You will work on the homework in Small groups
  - ✓ There should be no copy and paste
  - ✓ The copy and paste homework has zero points
  - ✓ Don't Cheat Yourself, Please!!!...

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Examination and Grading

- Exams
  - Term-wise Project: **20%**
  - Final-term Exam: **60%**

- Others
  - Class Activity: **10%**
  - Homework: **10%**

Class Rules

- Full attendance
- Please come on time
- Turn off your mobile.

Don't disturb your classmate !!!!

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Problems and Question

- ## Place:
  - Computer Science Faculty (Lecturer room)

- ## Internet contact :
  - *Mujtaba.cs01@gmail.com*
  - *https://github.com/mujtabaSultani01/design_patterns*

Course Contents

▸ Introduction to Design Patterns

▸ Java Overview

▸ What is Design Pattern?

▸ Observer Pattern

▸ Decorator Pattern

▸ Factory Pattern

▸ Singleton Pattern

▸ Command Pattern
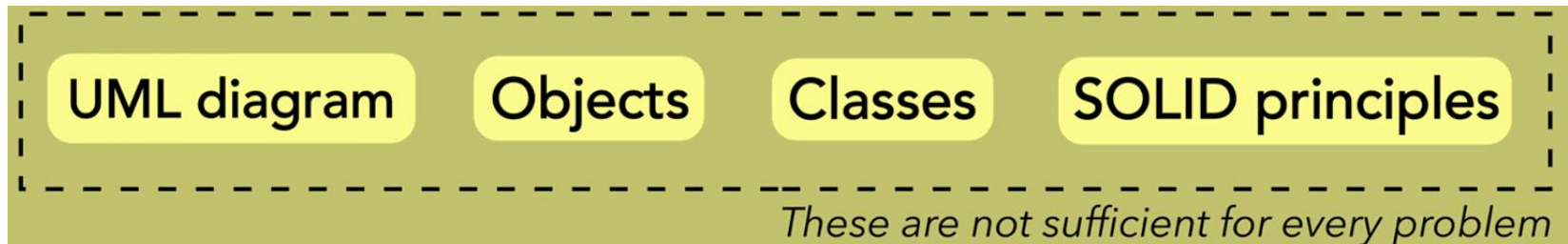
▸ Course Overview
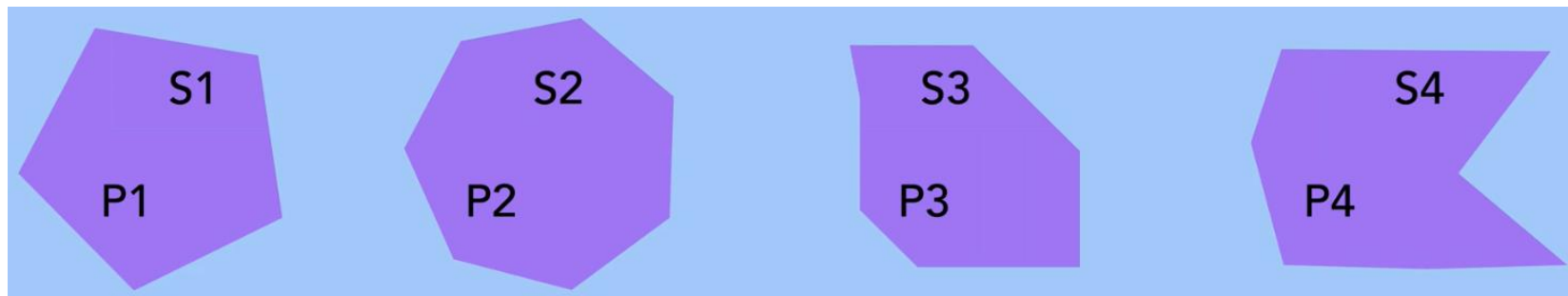
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Course Materials

▸ Dive into Design Patterns by Alexander Shvets. (Main reference)

▸ Design Patterns, Elements of Reusable Object-Oriented Software, by Erich Gamma, Richard Helm, Ralph Johnson, and John Vlissides. (Main reference)

Introduction to Design Patterns
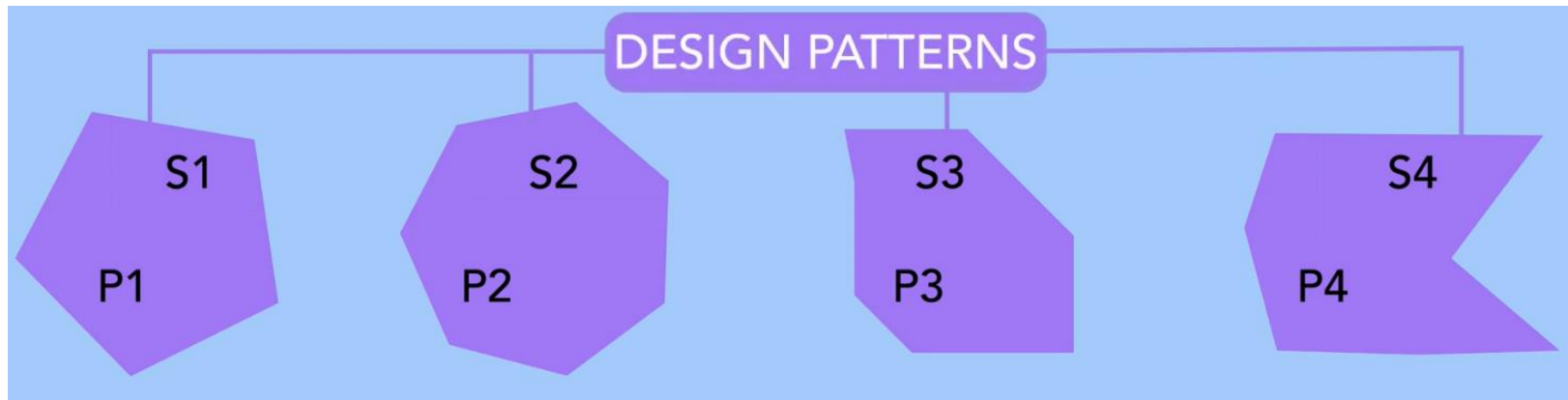
▶ Converging real world scenarios to object-oriented model…

| UML diagram | Objects | Classes | SOLID principles |

These are not sufficient for every problem

▶ Some commonly encountered complex design problems/scenarios …

S1 P1   S2 P2   S3 P3   S4 P4

Cont.

▶ Understanding these problems statements and solutions save us a lot of time rather than re-inventing what other developers have done earlier.
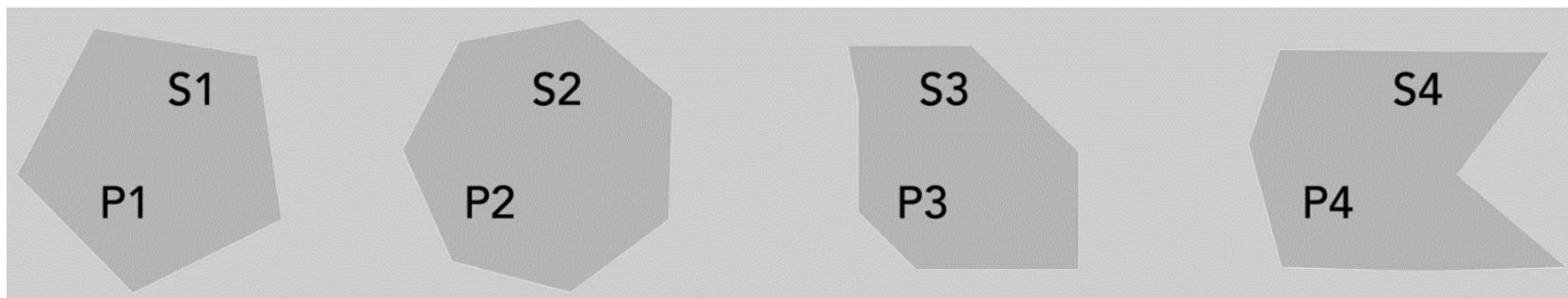

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Design Patterns Definition

Design Patterns
Elements of Reusable Object-Oriented Software

Erich Gamma
Richard Helm
Ralph Johnson
John Vlissides

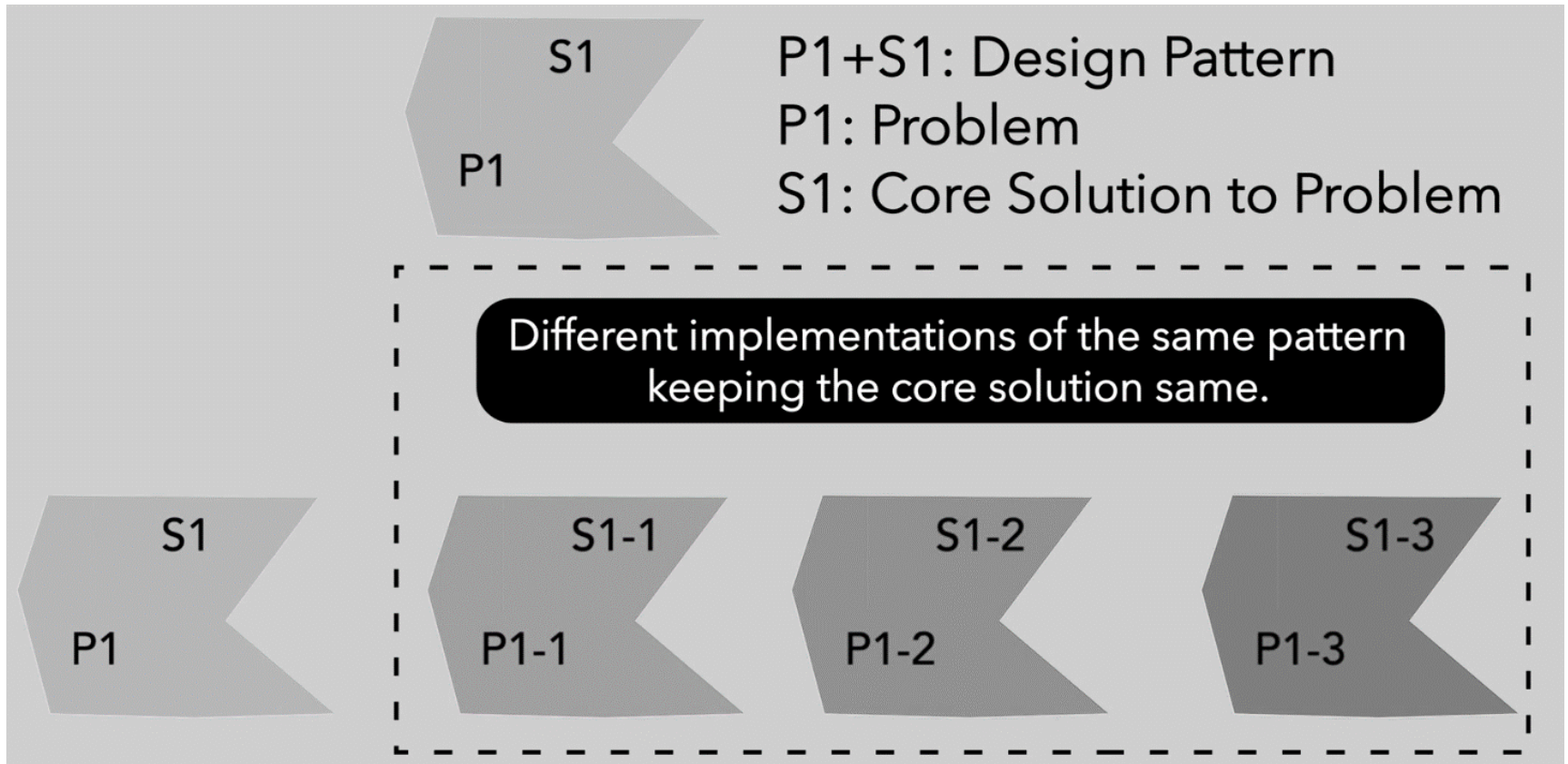Foreword by Grady Booch

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▸ Each pattern describes a problem that occurs over and over multiple times in our environment. Core of the solution to that problem can be used a million times without ever doing it same way twice.
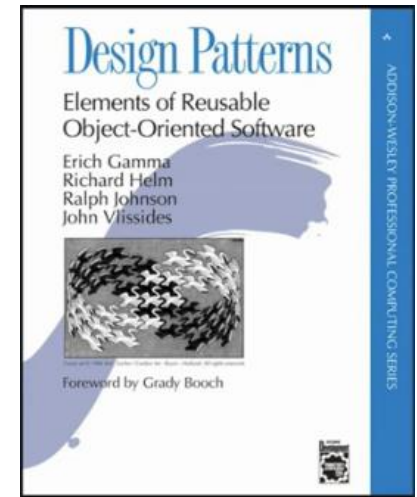
S1
P1

S2
P2

S3
P3

S4
P4

Design Patterns Definition

P1+S1: Design Pattern
P1: Problem
S1: Core Solution to Problem

Different implementations of the same pattern keeping the core solution same.

Design Patterns Definition

▸ Any design pattern consist of four parts:

- Pattern Name
- Problem
- Solution
- Consequences

Design Patterns Definition

❑ **Pattern Name**

- ▪ Gives you the idea about the problem what the pattern going to solve or how that particular problem can be solved using that pattern.

- ▪ Gives you vocabulary and a common ground to stand on while carrying on a technical discussion.

  - Factory pattern, singleton pattern, command pattern, …

Design Patterns Definition

❑ **Problem**

- The pattern actually describes the problem it's going to solve.

- Design pattern describe the kind of problem that we are solving.

  - Structure in town and cities …

Design Patterns Definition

❑ **Solution**

- ▪ The pattern describes the solution as well.

- ▪ Design pattern describe the way we solve a problem.

  - Structure in town and cities …

❑ **Consequences**

- ▪ Pro/Cons of applying a design pattern (trade-of).

- ▪ Where to use a design patter and where to not use a design pattern?

- ▪ Where to use new idea?

Home Work

▸ Create groups until next week (Maximum of two students).

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Design Patterns

References

▸ Dive into Design Patterns by Alexander Shvets.

Questions ...?

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