

# TP1: Design Principles and Patterns – Object-oriented Architectures

This assignment concentrates on the topics of object-oriented architectures and design and more specifically on design principles and patterns. All questions concern Elasticsearch (<https://github.com/elastic/elasticsearch>). To answer the questions, you can use any of the tools recommended on Moodle or any other relevant tool. Elasticsearch is a rather large system. In any case, you need to explicitly cite any tools and sources you have used to complete this assignment. Submit a single document per team with the answers to the questions. Include the name of your team and the names of all team members in the report. Include all external references, including articles, links, documentation and tools.

**Deadline: 05-Oct, 23h59**

## Question 1: Software architecture analysis (20 points)

You are asked to analyse the architecture of Elasticsearch with the goal to understand its organization. Focus mostly on functional modules, like “modules”, “client”, “server”, “plugins”, and ignore folders like “docs”, “test”, “dev-tools” and so on. Specifically, you are asked to:

1. Identify each package involved in Elasticsearch. (3 points)
2. By referring to the styles of architecture presented in the course, identify the architectural style(s) for the implementation of the system. (5 points)
3. By referring to the standard organization pattern as per the employed style(s), identify the role of each package in the architecture. (7 points)
4. Create an architecture (package) UML diagram to illustrate the architecture of the system. (5 points)

## Question 2: Design Patterns (30 points)

You are asked to:

1. Find and name 3 (GoF) design patterns. (6 points)
2. Present a UML diagram for each of the pattern as they are present in Elasticsearch (9 points)
3. Describe the patterns in detail: what is the functionality of the pattern in the system? What are the roles of each class? (15 points)

## Question 3: SOLID Design Principles (30 points)

You are asked to:

1. Find and name an instance of 3 different SOLID principles (an instance per principle) present in Elasticsearch. (6 points)
2. Present a UML diagram for each of the principles as manifested in Elasticsearch (9 points)
3. Describe the role of the classes (or the code snippets) relevant to the principle (15 points)

## Question 4: Violation of SOLID Design principles (20 points)

You are asked to:

1. Find a violation of a SOLID principle in Elasticsearch and name the violated principle (2 points).
2. Present the UML diagram and code snippets necessary to present the violation (4 points).
3. Explain why this constitutes a violation (justify your arguments) (6 points)
4. Fix the violation and present a diagram and/or code snippets with the corrected version (8 points).

### Note of evaluation

The submitted report will be evaluated on the accuracy and detail of the responses and the quality of its writing. Treat this as an official and professional report to management and colleagues.