Lecture 00

Lect. PhD.
Arthur Molnar

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# Introduction to Course

Lect. PhD. Arthur Molnar

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# Overview

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# Guiding professors

- Arthur Molnar, PhD.
- Alexandra Turian
- Radu Cibotaru

# Schedule

- **Lecture**: 2 hours/week
- **Laboratory**: 2 hours/every other week

## Course materials

https://github.com/cs-ubbcluj-ro/design-patterns

## Communications

Using MS Teams

# Objectives

**What should you gain from this course?**

- Learn about design patterns
- Improve you ability to understand source code and identify the principles used to build it
- Acquire and improve your skills in designing an object-oriented solution to a problem.
- Help you prepare the source code and presentation for the upcoming thesis defense and other presentations

# Course content

How is this course organized?

- Object Oriented Programming Recap
- SOLID Principles
- Design Patterns
    - Creational
    - Structural
    - Behavioural
- Architectural Patterns
- Enterprise Integration Patterns

# Design Patterns

- **Creational Patterns**
  - Factory
  - Builder
  - Prototype
  - Singleton
- **Structural Patterns**
  - Adapter
  - Bridge
  - Composite
  - Decorator
  - Facade
  - Proxy

# Design Patterns

- **Behavioural Patterns**
    - Chain of Responsibility
    - Command
    - Iterator
    - Mediator
    - Observer
    - State
    - Strategy
    - Template

# Architectural Patterns

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- Model View ViewModel (MVVM)
- Model View Controller (MVC)
- Model View Presenter (MVP)

# Enterprise Integration Patterns (selection)

- Introduction to Service Oriented Architecture, Micro-services, Messaging
- Point to Point Channel
- Message Translator
- Publisher/Subscriber
- Pipes and Filters
- Message Routing

# Bibliography

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1. Erich Gamma, Richard Helm, Ralph Johnson, John Vlissides - "Design Patterns: Elements of Reusable Object-Oriented Software", Addison-Wesley, 1994

2. Eric Freeman, Elisabeth Robson, Bert Bates, Kathy Sierra - "Head First Design Patterns", O'Reilly, 2004

3. Gregor Hohpe, Bobby Woolf - "Enterprise Integration Patterns: Designing, Building, and Deploying Messaging Solutions", Addison-Wesley, 2003

# Activity and Grading

- **The recommended way:**
    - **25%** - Team presentation during the lecture
    - **25%** - Laboratory work
    - **50%** - Colocvium (pattern presentation, Q&A session)
- **Option 2:**
    - **100%** - Written exam (in the regular session)
- **Option 3:**
    - **100%** - Written exam (in the retake session)

# Activity and Grading - Recommended way

- **25%** - Team presentation during the lecture
  - Teams made up of 3 students each (Presentation, Example 1, Example 2)
  - Presentation of one design pattern (scheduling info on Teams)
  - At least 2 examples from large-scale, open-source, real-life systems where it is implemented
  - Next week: Abstract Factory, Factory Method, Builder

- **25%** - Laboratory work
  - **Option 1** - Integrate and present 5 design patterns as part of your thesis project (creational, structural and behavioural)
  - **Option 2** - Implement, or extend an application of your choice with design patterns (creational, structural and behavioural)
    - Pac-Man game (Singleton, Factory, Prototype, Decorator, Strategy, Observer, Mediator)
    - Board games (Chess, Checkers, Five in a Row) (Singleton, Factory, Prototype, Decorator, Strategy, Observer, State, Mediator)
    - Sticky Notes app (Factory, Prototype, Singleton, Composite, Iterator, Observer, State)

- **50%** - Colocvium (pattern presentation, Q&A session)
  - Short presentation (10 minutes)
  - Pick 3 design patterns (different categories) from open-source software
  - Cannot pick the same system/pattern combo as another student
  - Short Q&A (5 minutes) regarding all patterns (creational, structural, behavioural, architectural)