

Lecture 03

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Arthur Molnar

Consultations
schedule

Introduction
to software
development

Basic notions

Simple
feature-driven
development
process

How to approach
Assignments 3
and 4

Introduction to Software Development

Lect. PhD. Arthur Molnar

Babes-Bolyai University

Overview

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2 Introduction to software development

- Basic notions
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- How to approach Assignments 3 and 4

Consultations schedule

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- Each professor has weekly consultation hours
- This is the time and place to ask for extra help
- There is no grading!
- Schedule will be posted on MS Teams

Introduction to software development

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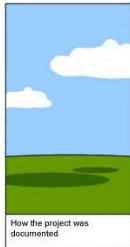
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Basic roles in software engineering

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Programmers/Developers

- Use computers to *write/develop* programs for users

Testers/QA:

- Check the program to discover errors

Clients/stakeholders:

- Everyone affected by the outcome of a project

Users

- *Run programs on their computers*

Basic roles in software engineering

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Software development process

An approach to building, deploying, and maintaining software.
It indicates:

- What tasks/steps must be taken during development.
- In which order?

Basic roles in software engineering

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A **software development process** is an approach to building, deploying, and maintaining software.

What we will use

Simple feature-driven development process

Example problem statement

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A *problem statement* is a short description of the problem being solved.

Calculator

A *teacher* (client) needs a program for *students* (users) who learn or use rational numbers. The program shall help students make basic arithmetic operations

Demo

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Simple feature-driven development

ex07_RationalCalculator.py

Requirements

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Requirements - define in detail what is needed from the client perspective. Requirements define:

- What the client needs.
- What the system must include to satisfy the client's needs.

Requirements

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Requirements guidelines

- Good requirements ensure your system works like your customers expect. (don't create problems to solve problems!)
- Capture the **list of features** your software is supposed to do.
- The list of features must clarify the problem statement ambiguities.

Features

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A **feature** is a small, client-valued function:

- expressed in the form **<action>** *<result>* *<object>*,
 - action - a function that the application must provide
 - result - the result obtained after executing the function
 - object - an entity within the application that implements the function
- and typically **can be implemented within a few hours** (in order to be easy to make estimates).

F1. Add number to calculator
F2. Clear calculator
F3. Undo last operation

Simple feature-driven development

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- An **iteration** is a set period of time within a project in which you produce a stable, executable version of the product, together with supporting documentation.
- An **iteration** will result in a working and useful program for the client (will interact with the user, perform some computation, show results)

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- Build a feature list from the problem statement
- Plan iterations (at this stage, an iteration may include a single feature)
- For each iteration
 - Model planned features
 - Implement and test features

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■ Example iteration plan

Iteration	Planned feature
I1	F1. Add number to calculator
I2	F2. Clear calculator
I3	F3. Undo last operation

Iteration modelling

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At the beginning of each iteration you must understand the work required to implement it. You must **investigate/analyze** each feature in order to determine work items/tasks. Then, work items are scheduled. Each work item will be independently implemented and tested.

Iteration modelling

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Iteration 1 - Add a number to calculator

- For simple programs (e.g. Calculator), running scenarios help developers understand what must be implemented.
- A **running scenario** shows possible interactions between users and the program under development.

Iteration modelling

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Iteration 1 - Add a number to calculator

	User	Program	Description
a		0	Shows total
b	1/2		Adds number to calculator
c		1/2	Shows total
d	2/3		Adds number to calculator
e		5/6	Shows total
f	1/6		Adds number to calculator
g		1	Shows total
h	6/6		Adds number to calculator
i		2	Shows total

Work items/tasks

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- Define a task for each operation not already provided by the platform, e.g. T1, T2.
- Define a task for implementing the interaction between User and Program, e.g. T4.
- Define a task for implementing all operations required by UI, e.g. T3.
- Determine dependencies between tasks (e.g. $T4 \rightarrow T3 \rightarrow T2 \rightarrow T1$, where \rightarrow means depends on).
- Schedule items based on the dependencies between them.

Work items/tasks

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Possible tasks for calculator application

Task	Description
T1	Compute the GCD of two integers
T2	Add two rational numbers
T3	Implement init, add and total operations
T4	Implement user interface

Test Cases

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Test case - A set of *test inputs*, *execution conditions*, and *expected results* that you identify to evaluate a particular part of a program.

Inputs: a,b	gcd(a,b)
2,3	1
2,4	2
6,4	2
0,2	2
2,0	2
24,9	3
-2,0	ValueError
0,-2	ValueError

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- You have to implement a command-based user interface
- Commands must work **exactly** as provided
- Code must be divided into functions
- Each function must only do one thing
- Functions do I/O, or calculations, but not both!
- Non-UI functions must have specification
- Must be turned in no later than week 7