



1

Last update: 5 April 2006

Software Architecture

Bertrand Meyer

ETH Zurich, April-July 2006

Lecture 1: Introduction



2

Goal of the course

Enabling you to master techniques for building and enhancing successful software systems of **large size** and **industrial quality**

This includes in particular:

- The move from programming to **software engineering**
- Principles of software engineering and in particular **software quality**
- **Object technology** principles and methods; the practice of object-oriented analysis, design and implementation
- **Design patterns**
- Principles of building **reusable** software



Five key topics

3

- Abstract Data Types
- Advanced Object Technology techniques
- Design Patterns
- Component-Based Development
- Integrated Development Environments (IDEs)



4

Teaching staff



Bertrand Meyer

5

E-mail: Bertrand.Meyer@inf.ethz.ch

Office: RZ J6

Secretary: Claudia Günthart, (01) 632 83 46



6

Exercise sessions

All groups have **one session a week**:

- Tuesday, 14:00 - 15:00

Registration in a few moments



The assistants

7

Bernd Schoeller (Coordinating Assistant)

Volkan Arslan
German

Till Bay
German (French)

Ilinca Ciupa
English

Martin Nordio
English

Stephan Classen <classens@student.ethz.ch> (Hilfsassistent)
German

Florian Geldmacher <florian@womaro.ch> (Hilfsassistent)
German



Practical information

8



Course material

9

Course page:

<http://se.inf.ethz.ch/teaching/ss2006/0050/>
→ Check it at least twice a week

Lecture material:

- Lecture slides
- Textbook:
 - Object-Oriented Software Construction,*
 - 2nd edition* -- Prentice Hall, 1997
 - Available from Polybuchhandlung
 - Sold during the break next week (≈ CHF 63 with Legi)

Exercise material:

- Exercise sheets
- Master solutions



Electronic forums

10

Discussion forums:

Inforum:
<http://forum.vis.ethz.ch>

Mailing list for each group

Advice and rules:

Use the forums and mailing lists! Take advantage of every help you can get.
Don't be shy. There are no stupid questions.

Criticism welcome, but always be polite to every participant and observe
the *etiquette*.

To email the whole teaching team (professor and assistants):

soft-arch-assi@se.inf.ethz.ch



Exercise sessions and project

11

Make sure to attend all sessions

Exercise sheets will be distributed by your assistant
during the exercise session

Do all exercises and the project



Exercises, "Testat" regulations (tentative)

12

"Testat": Needed for admittance to the exam.

Exercises:

- 6 project milestone exercises
- Project documentation
- Project presentation

To get the "Testat" you need to have done at least:

- 5 project milestone exercises
- Project documentation
- Project presentation
- Must show serious effort to address the questions
- Must have filled out questionnaire

Military services or illness ⇒ contact your assistant.

Programming environment

13

EiffelStudio download:

<http://www.eiffel.com/downloads/>

Free version available for Windows, Linux and MacOS

Exam: **end of semester**

14

Wednesday, 5 July 2006, 8-10 (normal class time)

2-hour exam

No material allowed

Covers all material in the semester

The project

15

Integral part of the course

Project is EiffelStudio-oriented

(Other possibility: Traffic-related project)

Public presentation: 28 June, main hall of HG

Large groups: two per assistant group

- Must organize yourselves
- All functions represented: developers, team leader, quality assurance, documentation, ...

And now for the real news...

16

EiffelStudio history:

- 1986 First Eiffel compiler (Eiffel 1) by Eiffel Software
Command-line compiler
- 1988 Eiffel 2
Constrained genericity, exceptions,
assignment attempt...
- 1990 First DOS implementation (Object Tools)
- 1993 Eiffel 3
Infix features, expanded classes...
Graphical environment: EiffelBench
Eiffel: The Language
- 1997 Eiffel 4
Precursor mechanism
EiffelBench becomes EiffelStudio
- 1999 Eiffel 5
Tuples, agents...
Free version
- 2005 ECMA standard 367
Attached types, ...

Other milestones

17

Object-Oriented Software Construction

1st edition, 1988

2nd edition, 1997

ECMA International, Standard 367

Eiffel: Analysis, Design and Programming Language

21 June 2005

ISO (International Standards Organization)

Revision of ECMA standard

Expected April 2006

Some Eiffel projects

18

Axa Rosenberg

Investment management: from \$2 billion to >\$40 billion

2 million lines of Eiffel

Chicago Board of Trade

Price reporting system

Eiffel + CORBA +

Solaris + Windows + ...

Boeing (Xontech)

Large-scale Eiffel

simulations of missile

defense system

Swedish social security: accident reporting & management



The news: Open-Source EiffelStudio

19

- Full technology will be available in dual licensing
- Open-Source version will be under GPL; applies to generated code as well
- Will be hosted at ETH: Origo server
- When and who?

The news: Origo

20

- Till Bay
- Environment under construction for distributed, cooperative, professional software development

Key URLs

21

- <http://eiffelsoftware.origo.ethz.ch>
-- Project web page
- <https://eiffelsoftware.origo.ethz.ch/svn/es>
-- Anonymous Subversion checkout

The course projects

22

EiffelStudio-related:

- > Build tool
- > Mac OSX release and installer
- > Port to new platforms (Mac OSX Intel, OpenBSD...)
- > Integrated support for configuration management
- > New refactoring support
- > Unicode support/improvements
- > IDE improvements (see assistant)
- > Direct code checking ("red squiggly underlines")
- > Integrated learning support
- > Extended static checking (difficult!)
- > Others (see assistant)

Traffic-related:

- > Streets and cars (traffic lights, speed limits...)
- > People with schedules for their day and first person view for traveling
- > Real buildings (Migros, Churches, Hauptbahnhof...)
- > Schedules for buses, trams etc., read from the Internet
- > Topological information: river, lake, mountains, boats, parks...
- > ...

This is a software architecture project

23

- Design quality is essential
- Large-group projects: must be organized like an industrial project
- Configuration management
- Documentation
- Quality standards (analysis, design, implementation)
- Should be useful ("*Eat your own dog food!*")

The public presentation

24

- June 29th, Hauptgebäude
- All projects will be demonstrated
- The best projects will be selected for presentation
- The best of the best will be included in future releases of Open-Source EiffelStudio



Next week (12 April)

25

Emmanuel Stauf, EiffelSoftware

EiffelStudio code walkthrough!

The Big Red Button

26

<http://origo.ethz.ch/unlock-eiffel/>



27

End lecture 1