



Last update: 5 April 2006

# Software Architecture

## Bertrand Meyer

ETH Zurich, April-July 2006

## Lecture 1: Introduction



# 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

---

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



# Teaching staff



E-mail: [Bertrand.Meyer@inf.ethz.ch](mailto:Bertrand.Meyer@inf.ethz.ch)

Office: RZ J6

Secretary: Claudia Günthart, (01) 632 83 46



# Exercise sessions

---

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

- Tuesday, 14:00 - 15:00

Registration in a few moments



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





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,*  
*2<sup>nd</sup> edition* -- Prentice Hall, 1997

Available from Polybuchhandlung

Sold during the break next week (≈ CHF 63 with Legi)

Exercise material:

- Exercise sheets
- Master solutions



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](mailto: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



"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.



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



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, ...



## 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, ...





## *Object-Oriented Software Construction*

1<sup>st</sup> edition, 1988

2<sup>nd</sup> 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

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





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?



Till Bay

Environment under construction for distributed,  
cooperative, professional software development



# Key URLs

---

<http://eiffelsoftware.origo.ethz.ch>

-- Project web page

<https://eiffelsoftware.origo.ethz.ch/svn/es>

-- Anonymous Subversion checkout



## 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

June 29<sup>th</sup>, 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!



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





# End lecture 1