

Advanced Topics in
Software Engineering
Novi Sad 2012/2013

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Advanced Topics in SE
Novi Sad
2012/2013
Teacher's report

Zoran Budimac

ATSE – general, 1

- Result of our Tempus project “Joint Master curriculum in Software Engineering”
- Offered continuously from 2006 in Novi Sad, Skopje, and Leicester
- “Survived” at least two accreditation processes in all three places
- Learning outcomes:

Upon successful completion of this module, the student will be able to:

- appreciate the need to learn new theories, models, techniques and technologies as they emerge;
- appreciate the necessity of continuing professional development and application of newest research achievements in the practice.

ATSE – general, 2

- Reported at least twice on this course in our workshops
- Last time – Hussein: blessing for the accreditation process:
 - You can always offer the new and fresh materials to students
 - Without the need to accredit the course first

ATSE, so far

- Model driven development
- Aspect oriented programming
- Software metrics

- Last year: Set of Software Quality Static Analyzers
(broad set of possibilities: compiler construction, data structures and algorithms, ...)

Organization

- Official announcement
- Introductory presentation
- Introductory set of literature
- Moodle site with resources
- Choice of the topic by students (after 3 weeks)
- Regular meetings (e.g. twice a month)
 - Everyone is requested to publicly present him/her achievements so far, state the plans, and ask for help
 - Everyone is expected to participate

ATSE, the future

- Offered
 - at the master level (3+2 scheme), 7.5 ECTS
 - At the PhD level (3+2+3 scheme), 7 ECTS
- Students from other free-style courses (even from Bachelor level 4+1 scheme) included, if possible
 - E.g. Compiler construction 2, Seminar paper C, D, ...

Learning outcomes at three levels

- Bachelor (i.e., guests from other courses) – technical stuff based on mostly complete documentation and papers
- Masters – elements of research and investigation + critical thinking (what approach would be better) + technical stuff
- PhDs – mostly research + critical thinking + overviews + supervising students at lower levels

Conclusion?

- Because of the broad set of topics this year (and, at the same time specialized, with the common goal), the number of participants was the higher this year
- But – the big efforts are needed from our side – thus older students are also helping the younger ones
- -> Trying to build a community working together on common goals (not always working though.)

Next two talks

- Gordana, regular assistant: more details on the course + reminder of the architecture with possibilities to work
- Milos, (PhD) student who took ATSE as one of his courses and had the task to guide two master students (from Skopje). His mark will be determined by the quality of the process and not the quality of students results.

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Assistant's report

Gordana Rakić

Content

- **About the course**
- Motivation
- History
- Participants
- Topics
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Content of the course

- Field of SE which is not covered by other regular and elective courses
- Always related to
 - Software Engineering
 - Research Methods

Elective course

- | | |
|---|--|
| <ul style="list-style-type: none"> ■ Master studies <ul style="list-style-type: none"> □ 1 semester □ 7.5 ECTS □ To do reasonable research on given topic and □ To produce: <ul style="list-style-type: none"> ■ A Product ■ A Paper | <ul style="list-style-type: none"> ■ PhD Studies <ul style="list-style-type: none"> □ 1 semester □ 7 ECTS □ To choose topic □ To do research □ To lead younger student (Bachelor or Master) in their research and projects □ To participate in producing <ul style="list-style-type: none"> ■ The product ■ The paper |
|---|--|

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Motivation...

- Benefits for both sides
 - Benefits to students
 - To enable students to work on real project
 - To provide students with broad range of possible topics
 - Benefits to existing projects
 - To find additional (at least temporal) members

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History

- 2009 – Software Metrics (techniques and tools)
 - Investigation of the field and preparation for the SMILE and SSQSA project
- 2010 - ...
 - SSQSA

2009 - Topics

- General topics
 - About metrics in general but from different aspects

- Goal Specific topics
 - Goal – to investigate application of the same metric (categories) to different languages

2009 - General Topics

- “Code Metrics and actual trends”
- “Actual trends in Design Metrics – techniques and tools”
- “Actual trends in application of Software Metrics to OO Programming Languages – techniques and tools”
- “Software Metrics application in other fields of Software Engineering”
- “Software metrics through Software Development Process“
- “Software Metrics in Software Evolution”
- “Role of software metrics in Software Project Management”
- “Software metrics application in Software Quality Assurance”

2009 - Goal Specific Topics (1)

- Halstead and CC
 - "Halstead Measure and Cyclomatic Complexity of Delphi, Pascal, ObjectiveC and Visual Basic Source Code - rules and tools"
 - "Halstead Measure and Cyclomatic Complexity of C#, C++, Ruby and Modula Source Code - rules and tools"
 - "Halstead Measure and Cyclomatic Complexity of Delphi, Pascal, ObjectiveC and Visual Basic Source Code - rules and tools"
 - "Halstead Measure and Cyclomatic Complexity of Java, C, Python and Basic Source Code - rules and tools"

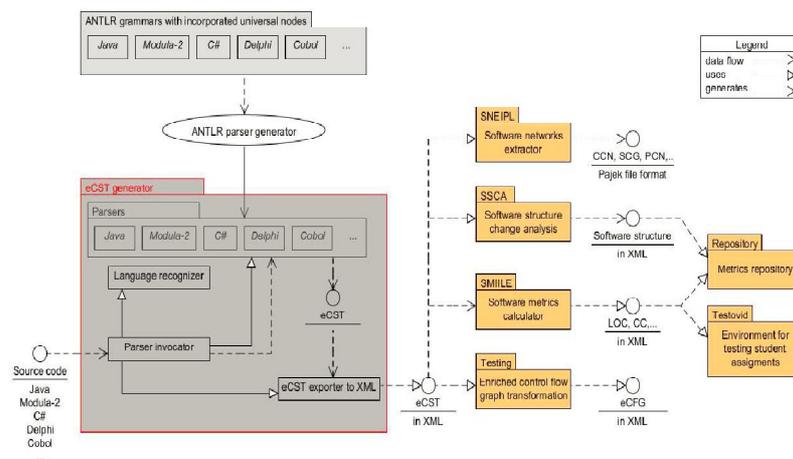
2009- Goal Specific Topics (2)

- Style and Design Metrics
 - Application of style and design metrics to Java, C, Python and Basic Source Code – rules and tools
 - Application of style and design metrics to C#, C++, Ruby and Modula Source Code – rules and tools
 - Application of style and design metrics to Delphi, Pascal, ObjectiveC and Visual Basic Source Code – rules and tools

2009 - Conclusion

- Students were interested to do research in metrics field
- Several iterations guided students to good results
- Theoretical parts were harder to students
- Practical parts were more interesting
- Several students delivered extra work 😊

2010 - ... SSQSA architecture



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Participants

- Professor
 - Zoran Budimac
- Assistant
 - Gordana Rakic
- Students
 - From Skopje 3 (Master students)
 - From Novi Sad
 - 2 PhD Students
 - 9 Master students (overall)
 - 1 IASTE student (started at the end of semester ☺)
 - Guest from ELTE Budapest (Melinda is talking about it)

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Front-end activities

- Haskell
 - 1 master student from Novi Sad, in progress
- Python
 - 1 master student from Novi Sad without results, IAESTE student will try
- WSL
 - 1 master student from Novi Sad, completed 😊
- OWL
 - Miloš Savić, PhD Student from Novi Sad (will be reported)

Front-end activities

- Scala
 - 1 master student from Novi Sad, started at the end of semester
 - Task – will cover two courses (ATSE and CC2):
 - to consider alternative usage of Scala instead of ANTLR
 - if possible to support Scala by usage Scala
 - If not possible to support Scala by usage ANTLR (regular way)
- Comparative analysis of Parser generators
 - 1 master student from Skopje, in progress
- Translator between grammar notations
 - 1 master student from Novi Sad, first prototype completed
- Guest student from ELTE:
 - Support for ERLANG, Melinda is going to report

eCST to eCFG transformation

- 1 PhD student (Miloš Savić from Novi Sad)
- 2 Master student (from Skopje)

- Possible application in testing
 - To be discussed

- Miloš is going to report it...

XML “repository”

- 1 PhD student from Novi Sad
- Task
 - To create XML structure for storing generated data (eCST, eCFG, networks, generated metrics, clones, etc)
 - To develop support for manipulation of XML data
- Goal: to enable easier manipulation with all generated data in order to provide useful information to user
- In progress

Code Clone Analysis

- 1 Master student
- Tasks
 - To explore available techniques
 - To choose the most appropriate one
 - To implement it
 - To write a short paper
 - To give a presentation on it (to do)
- Used: tree based technique

Metrics implementation

- Implementation of missing metrics
 - Three tasks - three master students:
 - On networks (in progress ☺)
 - On independent eCST (on compilation unit) ☹
 - On eCST, but with modification of it ☹
 - Task in general:
 - To find software metrics that belong to corresponding category
 - To implement the algorithms (in progress)
 - To write a short paper
 - To give a presentation on it

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Results

- 15 students + 1 guest
 - Completed: 3
 - Gave up: 3

- 13 tasks + 1 guest's task
 - Completed: 4
 - Canceled:
 - 2 completely
 - 1 partially (another student will continue)

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Conclusion

- In order to get some results: Not to leave students without dynamics
- In order to get appropriate results: Not to leave students without control
- In order to keep the SSQSA alive and in appropriate form
 - Integrate everything after delivery
 - Regularly reengineer everything needed

- Students
 - At the beginning: exited
 - In the middle: scared (in panic)
 - At the end (if arrive there): satisfied

- Introductory parts were more difficult to students
- Practical parts were more interesting
- Advantage: Individual work with students
 - obvious difference between students with ad without experience
 - differences in students' interests

Advanced Topics in SE Novi Sad 2012/2013 PhD student's report

Miloš Savić