



Advanced Software Engineering

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Reading Assignment: Problem Solving

1. Mandatory preparation tasks (to be done PRIOR to the lecture)

1.1 Mandatory reading

- Read [Jackson 2005] on Problem Frames. For deepening your understanding, you may study the slides by Jackson [Jackson 2006]. From [Jackson 2005] extract in particular
 - Problem Frames as a problem solving technique,
 - The impact of the entailment $S, W \mid - R$,
 - The role of normal vs. radical design.Please note that there are typesetting errors in [Jackson 2005]:
 - Page 905, left column: $S, W \mid R$ should be $S, W \mid - R$
 - Fig. 2 and 3: \bowtie should be \approx .
- Read [Shaw 2012] on Design Spaces. Reflect on the role of design spaces for problem analysis and problem solving. Search for examples of design spaces in your own software design experience.
- Read the essay by Grady Booch [Booch 2012] on balancing discovery, invention, and implementation when tackling innovation problems. Contrast this with the notion of a well-organized software development process.
- In his essay, Booch mentions Parnas' approach of faking a design process. He actually doesn't cite the corresponding paper; maybe assuming that every software engineer knows that seminal paper. In fact, if you want to call yourself a software engineer, you must have read this paper [Parnas and Clements 1986]. In the context of this assignment, you must at least browse the paper and get an idea of Parnas' and Clements' notion of faking a rational design process.
- Read the section on Parnas Tables in [Herrmannsdörfer et al. 2008] for a short account of the so-called four-variable model, originally developed by Parnas and Madney (1995). For which class of problems does the four-variable model provide a generic problem solution?
- Repeat/recall other problem structuring and problem solving approaches such as
 - Design patterns and architectural patterns, in particular Model-view-controller [Krasner and Pope 1988]
 - Abstraction / Information hiding [Parnas 1972] / Design by Contract [Meyer 1992]
 - The 4+1 View [Kruchten 1995]and analyze what & how they contribute to organizing and solving problems.

1.2 Preparation tasks

Be prepared to

- summarize the papers you have read,
- answer questions in class,
- discuss your insights from your reading in class.

2. Optional reading

- You find an in-depth treatment of problem frames in Jackson's book [Jackson 2001].
- As mentioned above, once in your lifetime you should read [Parnas and Clements 1986] in full.
- We recommend reading Brooks' book on design [Brooks 2010], in particular Chapters 2 and 3.

3. Lecture

There will be no classic lecture. Instead, we will discuss the topic based on your reading.

References

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- Jackson (2001). *Problem Frames: Analysing and Structuring Software Development Problems*. Harlow: Addison-Wesley.
- M. Jackson (2005). Problem Frames and Software Engineering. *Information and Software Technology* **47**, 14 (Nov 2005). 903-912.
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- Parnas, D.L. (1972). On the Criteria To Be Used in Decomposing Systems into Modules. *Communications of the ACM* **15**, 12 (Dec. 1972). 1053-1058.
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- Shaw, M. (2012). The Role of Design Spaces. *IEEE Software* **29**, 1 (Jan 2012). 46-50.

Hints

- Jackson (2001) is available in the Ifl library (Standardliteratur Glinz)
- Jackson (2005) is available (free download from the uzh.ch domain) at <http://www.sciencedirect.com/science/article/pii/S0950584905001229>
- Herrmannsdörfer et al (2008) can be downloaded from <http://www.crosstalkonline.org/storage/issue-archives/2008/200803/200803-Herrmannsdrfer.pdf>
- Papers published by IEEE are downloadable from the IEEE digital library (<http://ieeexplore.ieee.org>; free access from the uzh.ch domain)
- The other papers/slides will be made available at <http://www.ifi.uzh.ch/seal/teaching/courses/ase.html>
- The Problem Frames notation is summarized in Appendix 1 (pp.354-360) of Jackson (2001).