

ASE Papers on specification... **...that influenced me**

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Specification in ASE

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- Specification is rarely the goal of ASE research, but it is often combined with
 - Program Synthesis
 - Verification or Validation
 - ...

- Two papers on Specification and Testing



TestEra [ASE 2001]

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[MK01] Darko Marinov, Sarfraz Khurshid

*TestEra: A Novel Framework for
Automated Testing of Java Programs*

Int Conf Automated Software Engineering
San Diego, IEEE CS Press 2001

The Testera tool

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- Other researches addressed these topics, but here the **integration** was original and unique!

Automatic generation
of abstract inputs
from the specification

Use the specification
as test oracle

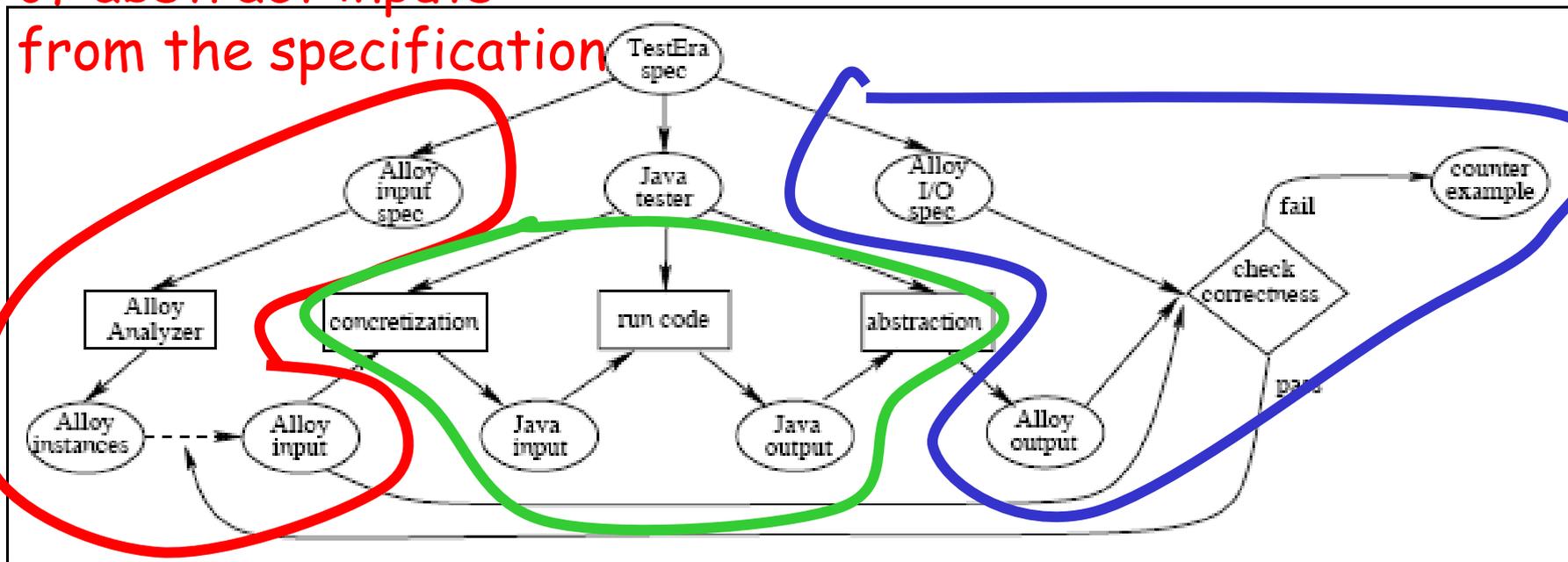


Figure 1. Basic TestEra framework

Fig. from [MK01]

connection between abstract (Alloy) and concrete (java) levels



Structure of [MK01]

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- Underlying principles nicely explained in 4 pages!
- Rest of the paper dedicated to 3 convincing case studies:
 - Real data structure from Java library demonstrates the applicability to **real software**
 - Service identification algorithm (**real bugs from outside the group**)
 - Code from the Alloy Analyser (**use your own medicine**)

[MK01] Darko Marinov, Sarfraz Khurshid

TestEra: A Novel Framework for Automated Testing of Java Programs



Historical perspective

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- One paper from a stream of research
 - Starting with the Alloy papers (including an invited talk at ASE'99)
 - Continuing with the Korat tool (ISSTA 2002)
 - A single paper is not necessarily influential, it is a member of a set of influential research!

Experiments in Test Suite Reduction [2004]

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[HG04] Mats Heimdahl, Devaraj George

*Test-Suite Reduction for Model Based
Tests: Effects on Test Quality and
Implications for Testing*

Int. Conf. Automated Software Engineering

Linz, IEEE CS Press 2004

Test Suite Reduction

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- **The problem**
 - Given a test suite T ,
Find a subset S included in T
Such that
 S has the same « coverage » than T
- **Greedy algorithm:**
 - Start with an empty S
 - Repeat
 - Choose a test randomly in T
 - If it increases the coverage
Then add it to S
 - Until you reach the coverage of T



Experimental study in [HD04]

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- Taken from an industrial project in air and space (flight guidance system from Rockwell Collins)
- Project led at the specification level:
 - Used the specification to measure coverage
 - Generated 100 faulty specifications
 - Compare the number of faults detected by T and S

[HG04] Mats Heimdahl, Devaraj George

Test-Suite Reduction for Model Based Tests:

Effects on Test Quality and Implications for Testing



A stream of research

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- Early and seminal papers in that domain by M.J. Harrold and G. Rothermel in the beginning of the 90's
- Several studies tried to answer the question:
Does S has the same fault detection capabilities as T?
- Previous empirical studies did bring totally different results.

Results

Criteria	Full Set	Run 1	Run 2	Run 3	Run 4	Run 5	Average	Reduction
Variable Domain	32	28	29	25	28	25	27.0	15.6%
Transition	64	58	58	58	59	57	58.0	9.38%
Decision	67	62	61	62	62	61	61.6	8.06%
Decision Usage	69	62	63	63	62	63	62.6	9.28%
MCDC	70	64	63	63	63	63	63.2	9.71%
MCDC Usage	72	67	66	67	67	67	66.8	7.22%

Table 3. Fault finding capability of the reduced test-sets [HD04]

- Reduced test suites always have lower fault detection capabilities
- 7,22% is small, but unacceptable for air and space applications

[HG04] Mats Heimdahl, Devaraj George

Test-Suite Reduction for Model Based Tests:

Effects on Test Quality and Implications for Testing



Why is it a good paper?

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- Very well written !
(I give it to read to my students)
- Excellent **survey** of the foundations and related work
- Picks up an **open question**...
- Answers it by a **solid experimental evaluation**.



Conclusion

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- The **quality of writing** is a significant element for influential papers...
- ...But it must rely on **strong and mature research work!**
- None of these papers is the « seminal » paper...
- But these are within a **stream of research**



Question: can ASE papers be « influential »?

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- The ASE PC requires papers with **extensive evaluation**
 - Most of the paper dedicated to experimental evaluation
 - Remaining space only sufficient to provide a **synthetic view** of the underlying ideas
- **Yes**, ASE papers can demonstrate the effectiveness of some technique/tool
- **But seminal papers** might end up as **short papers...**