

# Softwarepraktikum: An Extension for NuSMV

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# AG Discrete Biomathematics



- ▶ Prof. Dr. Heike Siebert
  - ▶ Dr. Hannes Klarner
  - ▶ Adam Streck
  - ▶ Kirsten Thobe
  - ▶ Firdevs Topcu-Alici
- 
- ▶ mathematical modelling of gene regulation and signal transduction

# Design of Correct Software and Hardware



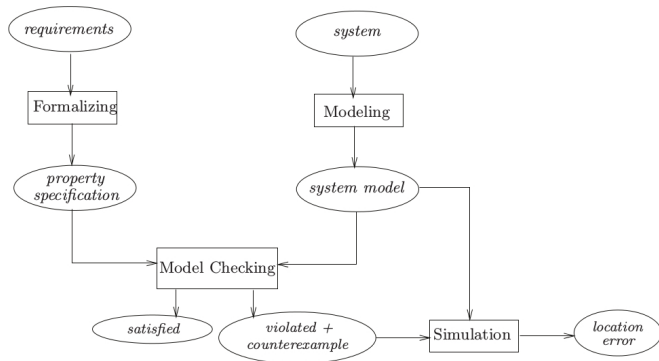
- ▶ its about money: Intel Pentium FDIV Bug, 1994
- ▶ its about safety: Therac 25 Radiation Overdosing, 1985-87
  
- ▶ usual practice: peer review and testing

# Design of Correct Software and Hardware



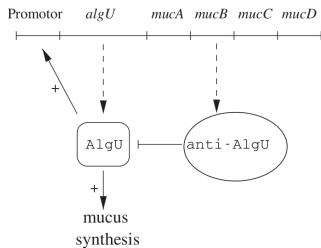
- ▶ its about money: Intel Pentium FDIV Bug, 1994
- ▶ its about safety: Therac 25 Radiation Overdosing, 1985-87
  
- ▶ usual practice: peer review and testing
- ▶ since the early nineties: symbolic model verification (SMV)

# Model Checking



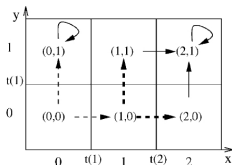
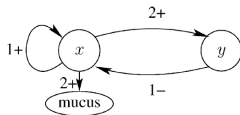
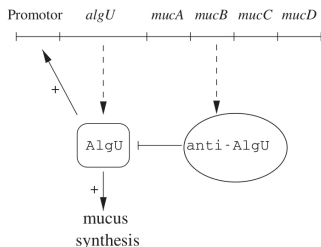
- ▶ system model = finite state machine
- ▶ property specification = temporal logic

# Systems Biology

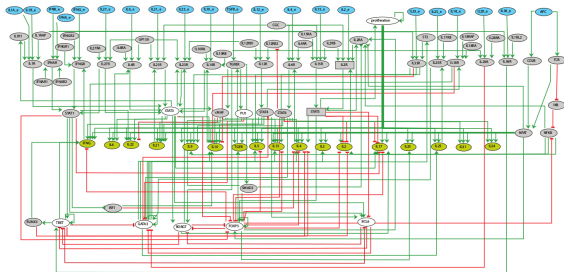


- ▶ Mutation or epigenetic phenomenon?

# Systems Biology



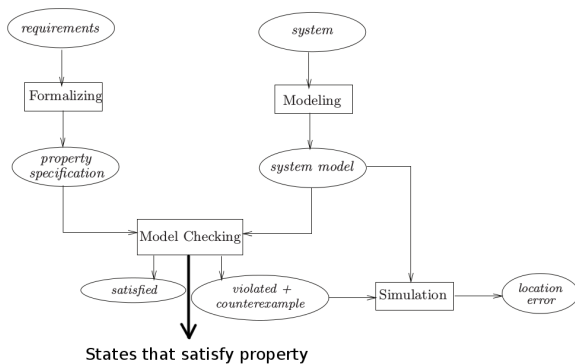
- ▶ qualitative gene regulation = finite state machine
- ▶ possibility of epigenetic phenomenon = temporal logic



- ▶ state explosion problem
- ▶ NuSMV developed since 1993
- ▶ Turing award for E. Clarke in 2007



# NuSMV Extension



# Project Plan

March		April		May	
1 Tue		1 Fri		1 Sun	
2 Wed		2 Sat		2 Mon	
3 Thu		3 Sun		3 Tue	
4 Fri		4 Mon		4 Wed	
5 Sat		5 Tue	Programming	5 Thu	
6 Sun		6 Wed		6 Fri	
7 Mon		7 Thu		7 Sat	
8 Tue		8 Fri		8 Sun	
9 Wed		9 Sat		9 Mon	
10 Thu	Introduction	10 Sun		10 Tue	
11 Fri		11 Mon		11 Wed	
12 Sat		12 Tue		12 Thu	
13 Sun		13 Wed		13 Fri	
14 Mon		14 Thu		14 Sat	
15 Tue		15 Fri		15 Sun	
16 Wed		16 Sat	Documentation	16 Mon	
17 Thu		17 Sun		17 Tue	
18 Fri		18 Mon		18 Wed	
19 Sat	Understand existing code and libraries	19 Tue		19 Thu	
20 Sun		20 Wed		20 Fri	
21 Mon		21 Thu		21 Sat	
22 Tue		22 Fri		22 Sun	
23 Wed		23 Sat		23 Mon	
24 Thu		24 Sun		24 Tue	
25 Fri		25 Mon		25 Wed	
26 Sat		26 Tue		26 Thu	
27 Sun		27 Wed	Presentation	27 Fri	
28 Mon		28 Thu		28 Sat	
29 Tue		29 Fri		29 Sun	
30 Wed	Programming	30 Sat		30 Mon	
31 Thu				31 Tue	

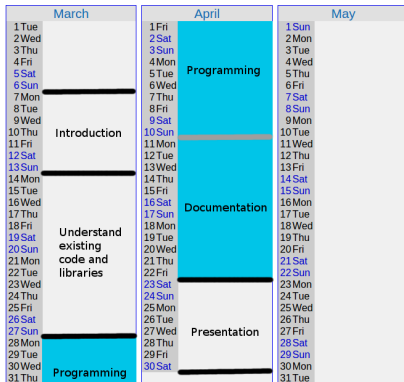
- ▶ introduction to model checking, NuSMV, PyBoolNet

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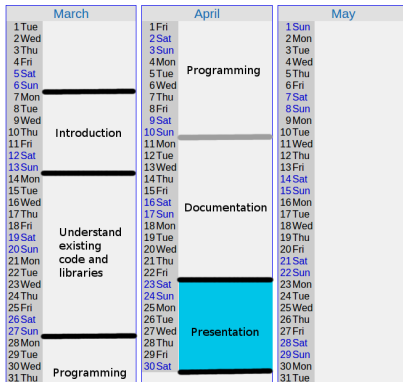
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- ▶ specification of plug-in

# Project Plan



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- ▶ official contribution?

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Thanks!