Software Quality FS 2017

Introduction - Exercise 1

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Exercises
Formalities

Necessary conditions to pass the module:

1. Pass the two assignments
2. Pass the exam

Assignments are to be solved in groups of three students

Exercises
Schedule

#	Theme	Release	Due	Discussion
1	Model Checking	Feb 27	Mar 6	Mar 13
2	Testing and Debugging	Mar 13	Mar 20	Apr 03

Wiki and documentation:

http://daiquiri.ifi.uzh.ch/trac/swq17

Register using student number as username

Model Checking
Presentation of SPIN

- 1980 (Bell labs) – 1991 (freely available)
- Widely used in industries building critical systems
- Simulator and Exhaustive verifier (Unreachable code, deadlocks, violation of assertions, etc)
- Model to be verified written in Promela
- Properties expressed in LTL

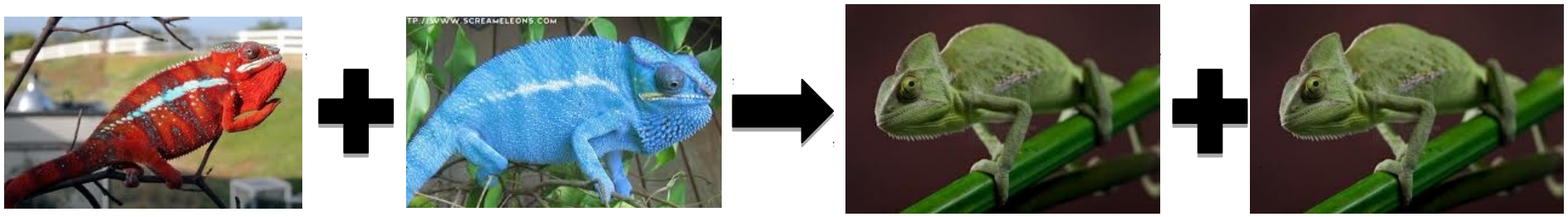
Model Checking
Presentation of SPIN

- Command line tool
- Requires C pre-processor / compiler
- Available on the macs in the lab

(room 0.B.04 – First row)

Colony of Chameleons
Introduction

A colony of chameleons includes 99 individuals
- 34 red, 35 blue, 30 green



Whenever two chameleons of different colors meet, each changes to the third color.

Colony of Chameleons

Promela Model

```
#define NRED  (34)
#define NBLUE   (35)
#define NGREEN (30)

short nRed = NRED;
short nBlue = NBLUE;
short nGreen = NGREEN;

active proctype mutations() { ... }
active proctype observer() { ... }
```

"C" Macros:
- Constants
- Predicates

Data Types

Global Variables

Process Declarations

Colony of Chameleons

Mutations Process

```
active proctype mutations()
{
  do
  :: d_step {nRed && nBlue;
        nRed--; nBlue--; nGreen = nGreen + 2;}
  :: d_step {nRed && nGreen;
        nRed--; nGreen--; nBlue = nBlue + 2;}
  :: d_step {nBlue && nGreen;
        nBlue--; nGreen--; nRed = nRed + 2;}
  :: else
  od
}
```

Model Checking

Random / Interactive Simulation

spin model.pml

spin -i model.pml

Colony of Chameleons
LTL Formula

Could red chameleons (temporarily) disappear?

LTL Formula:

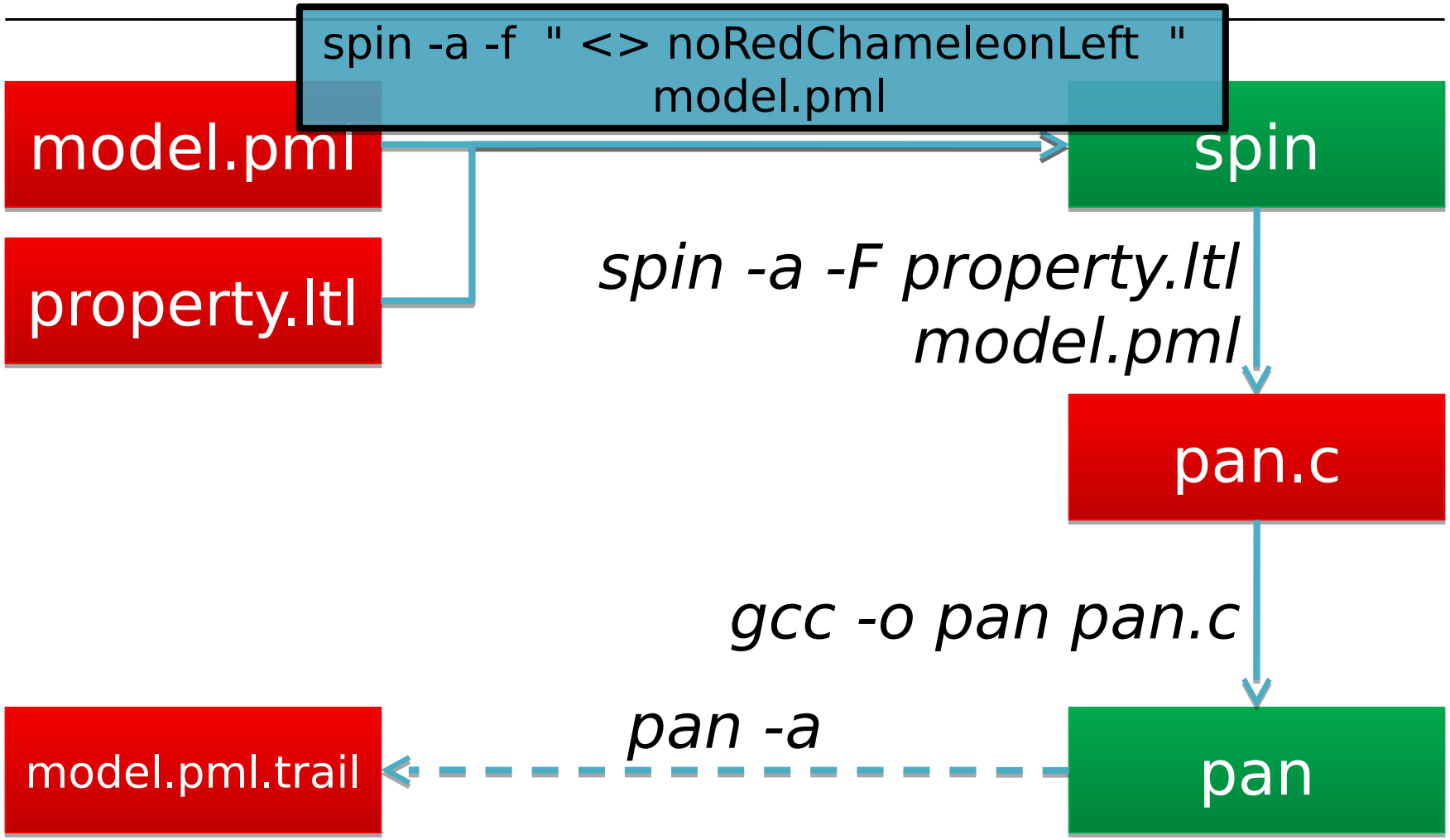
<> noRedChameleonLeft

Addition to the Promela Model:

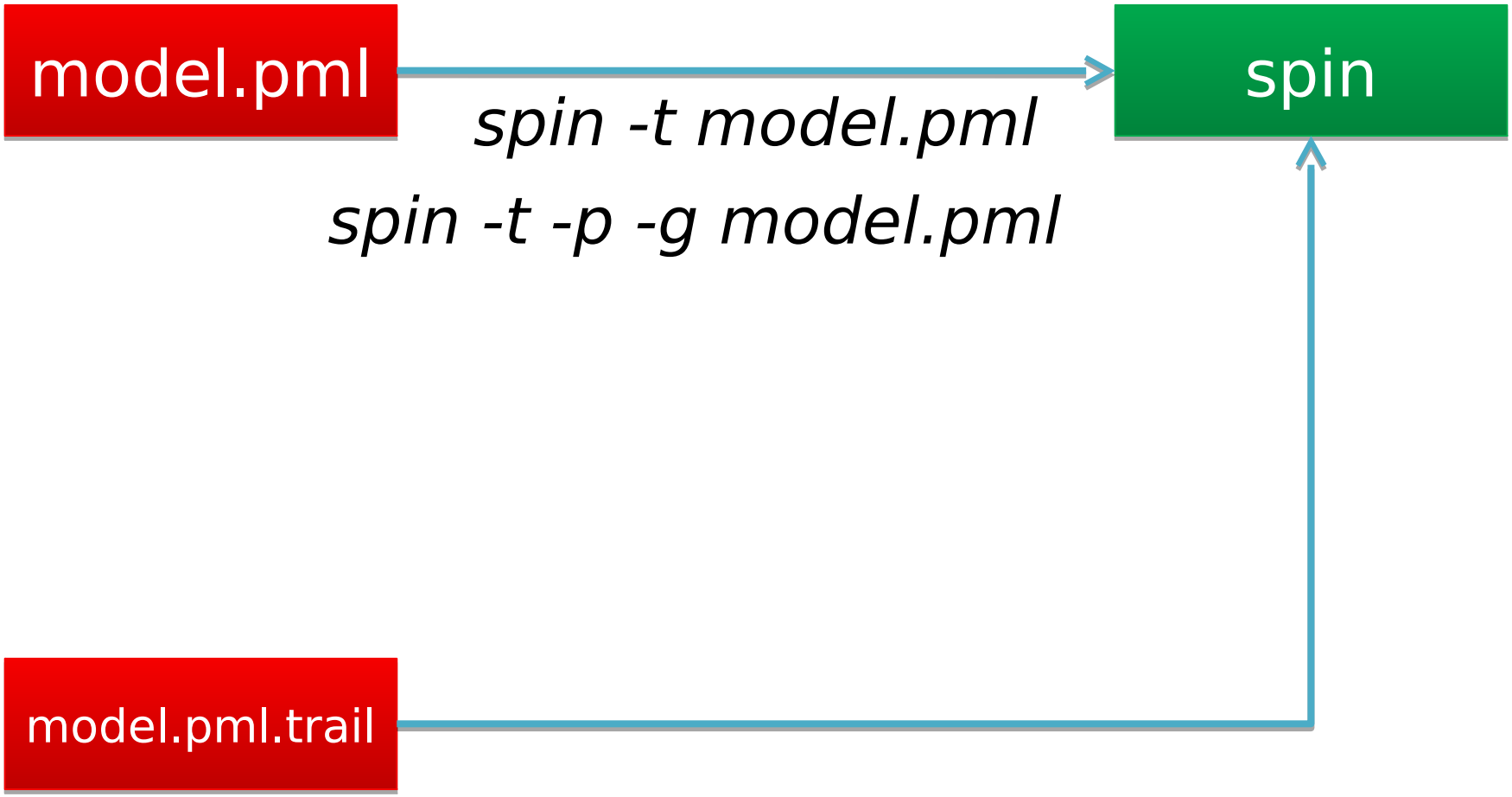
```
#define noRedChameleonLeft    (!nRed)
```

Model Checking

Verification



Model Checking
Guided Simulation



GOOD LUCK!

More info about Spin and Promela:
http://daiquiri.ifi.uzh.ch/trac/swq17