

Software Quality FS 2014

Introduction - Exercise 1

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2.B.17



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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 24th	Mar 5th	Mar 10th
2	Testing and Debugging	Mar 10th	Mar 19st	Mar 24th

Wiki and documentation:

<http://daiquiri.ifi.uzh.ch/trac/swq14>

Register before Mar 5th 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

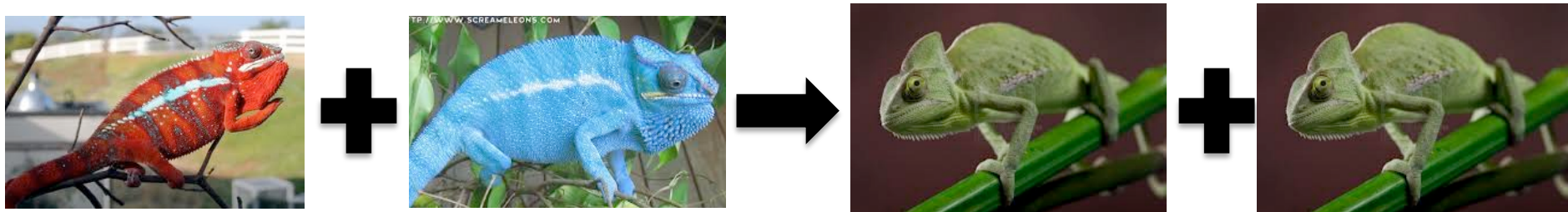
Presentation of SPIN

- 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 54 individuals
20 red, 18 blue, 16 green



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

Colony of Chameleons

Promela Model

```
#define NRED      (20)
#define NBLUE    (18)
#define NGREEN   (16)
```

```
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

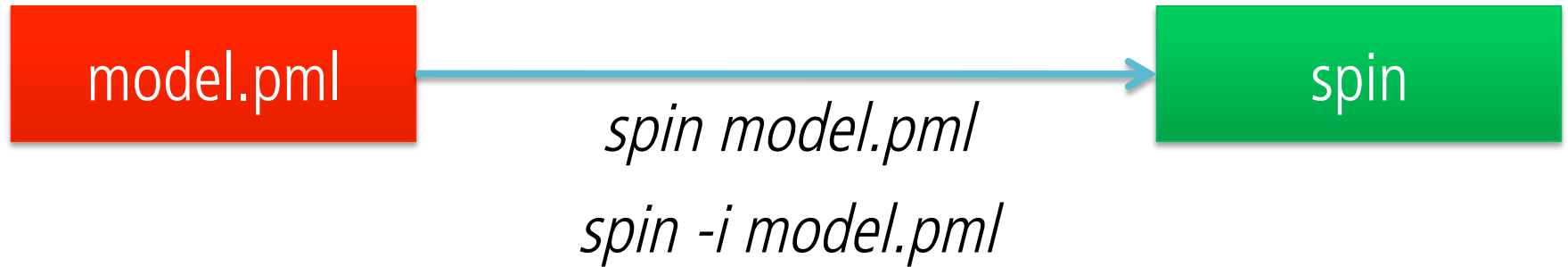
Colony of Chameleons

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



Colony of Chameleons

LTL Formula

Could red chameleons (temporarily) disappear?

LTL Formula:

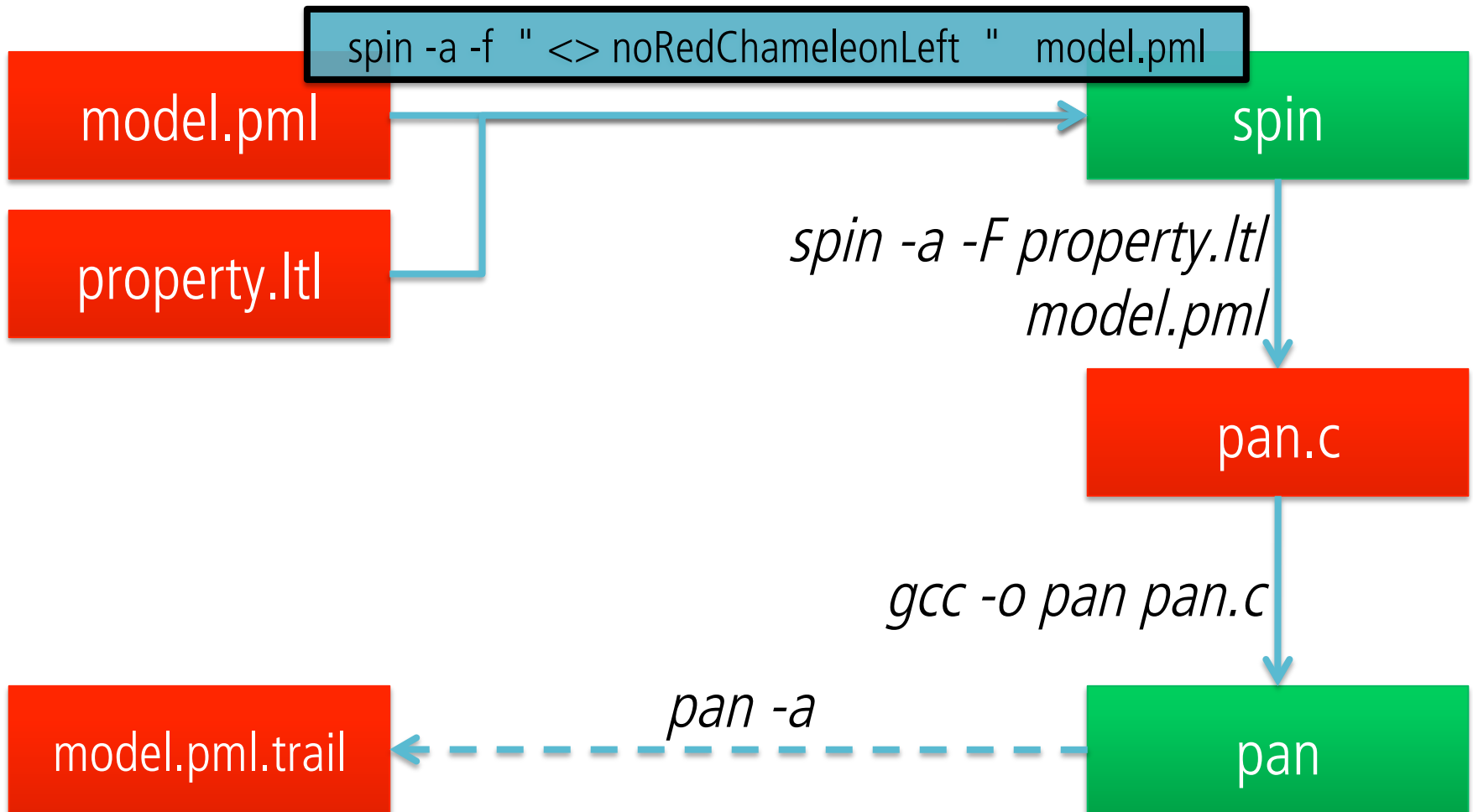
`<> noRedChameleonLeft`

Addition to the Promela Model:

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

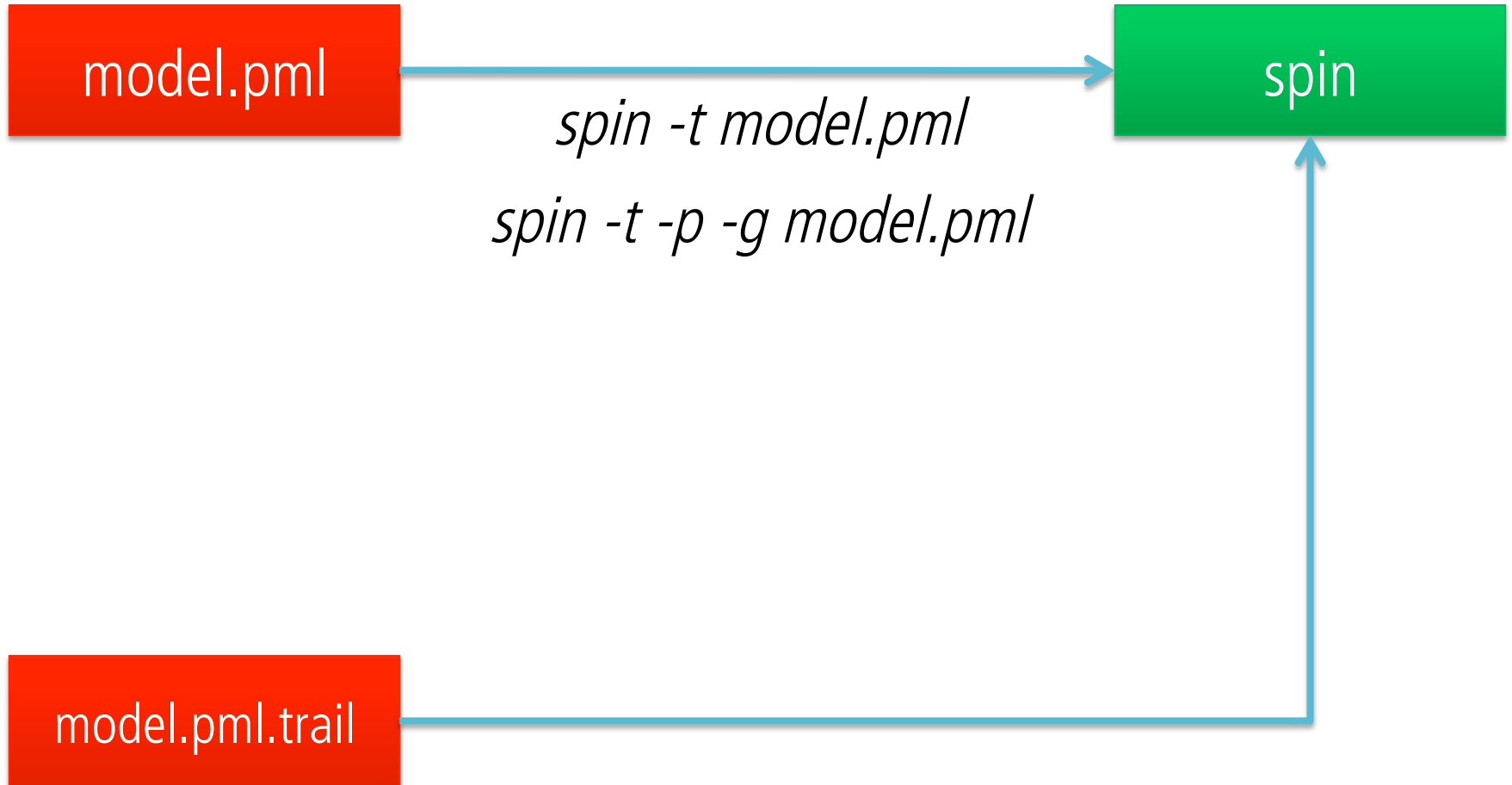
Model Checking

Verification



Model Checking

Guided Simulation



GOOD LUCK!

More info about Spin and Promela:

<http://daiquiri.ifi.uzh.ch/trac/swq14>