Applied Model-Based Testing

Automatically Generate
Execute and Evaluate tests

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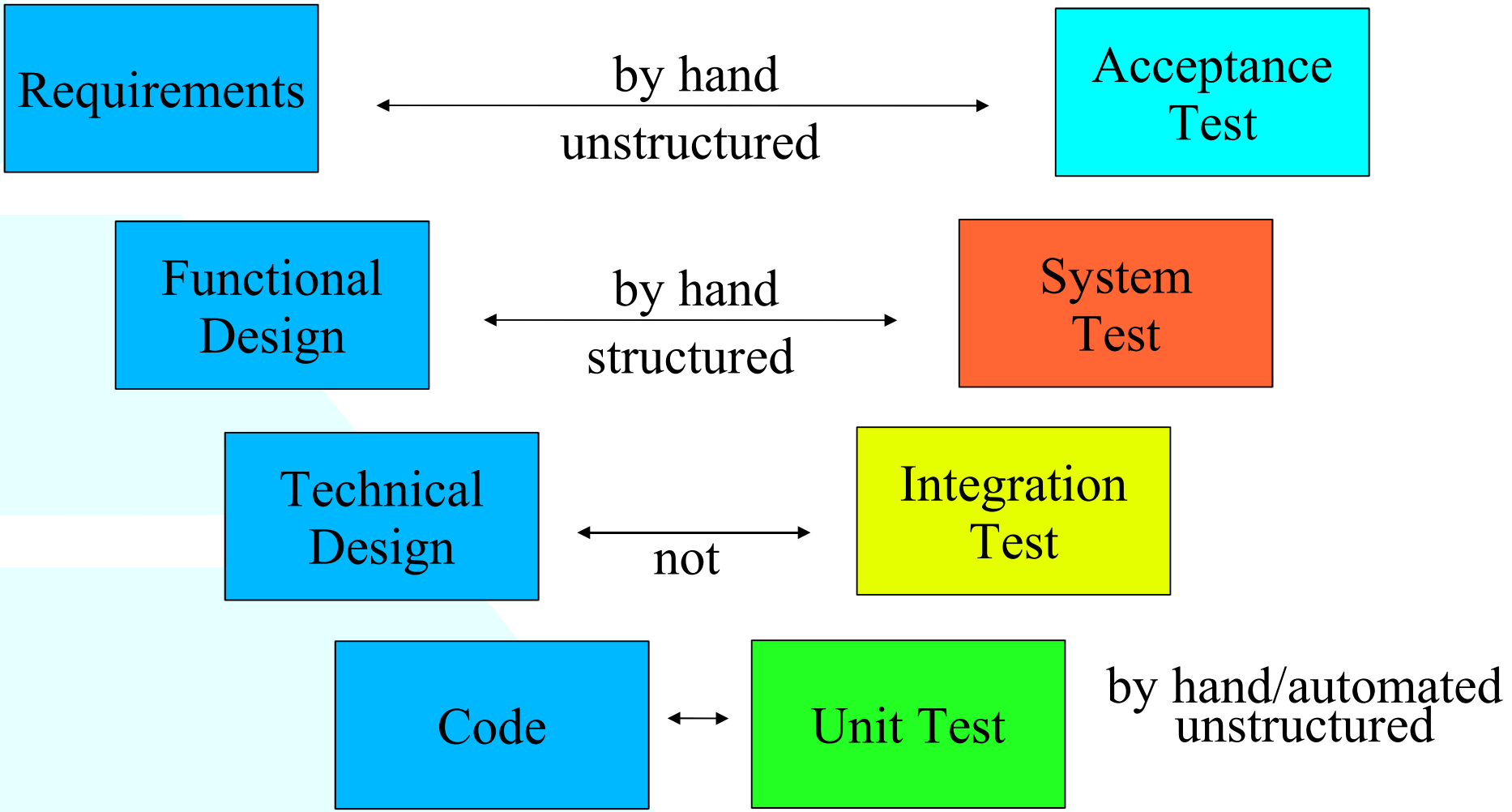
Axini, UT spin off

- Testing **complex** hardware/software systems
- Machiel van der Bijl, testing complex systems
  - Ordina Utopics, senior consultant
  - Finishing PhD, Twente University
- Menno Jonkers, innovative software development
  - Interpay, analyst
  - Ordina Utopics, senior consultant
  - Tryllian, CTO

Observations of testing in the wild



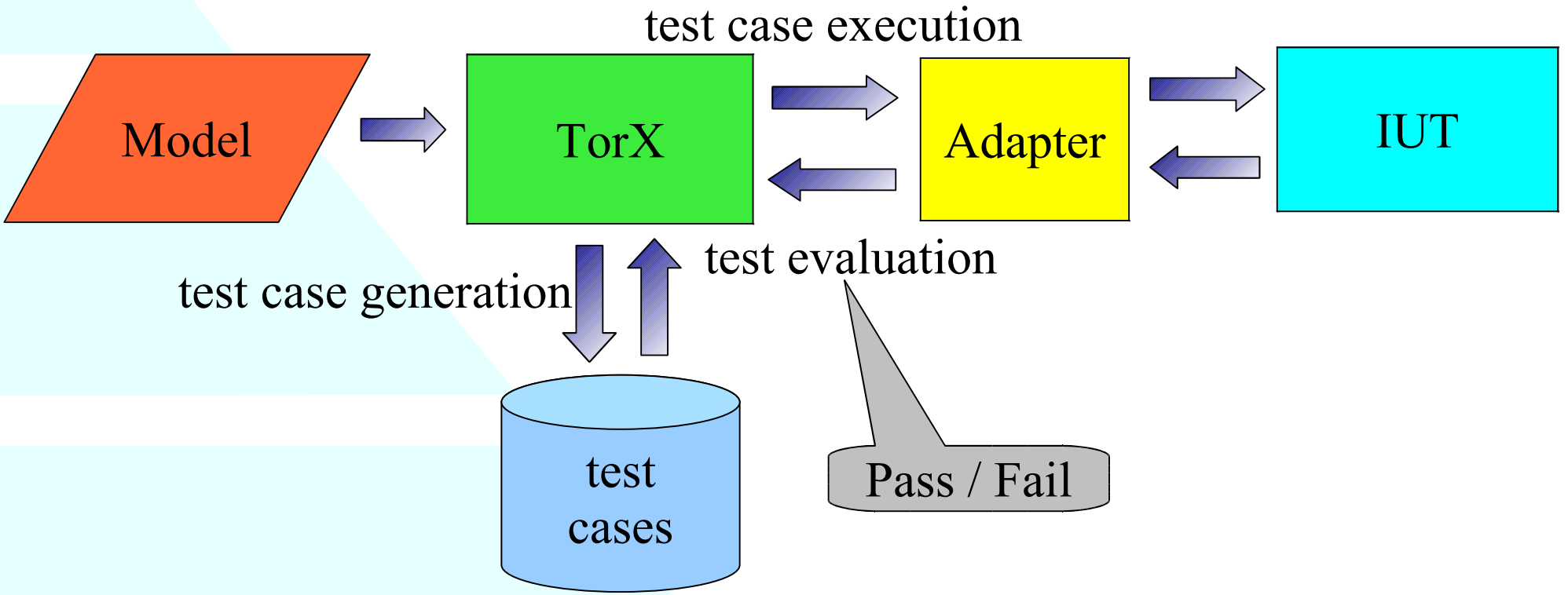
Testing by hand: poor coverage

- Good coverage requires: thousands of test cases
- Manual testing delivers < 100 test cases
- Creation, execution, evaluation
  - Time consuming
- Hard/expensive to repeat

Model Based Testing

- Automatic
  - Test case generation
  - Test case execution
  - Evaluation of outcome of test execution
- Based on a model
  - Specification of IUT in specification language
  - Promela for this presentation

Model Based Testing with TorX

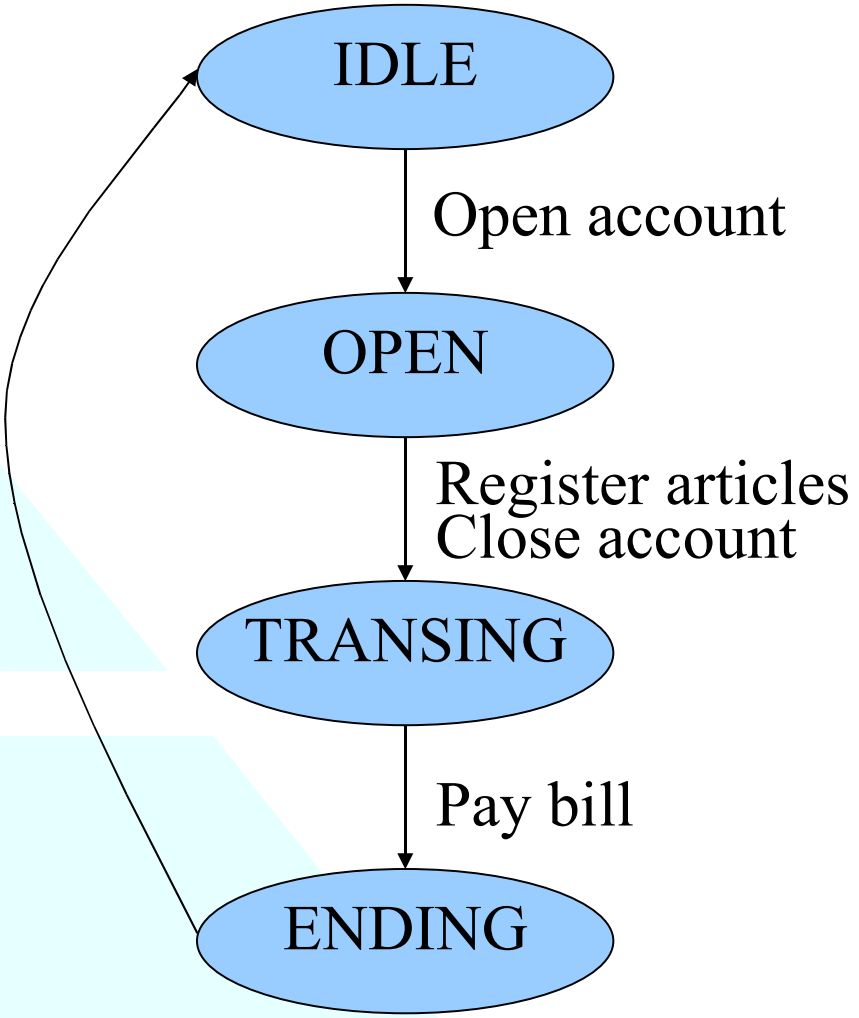


Demo: self scan check out

POS protocol

- We test the communication protocol between Check out and POS
- It is too big to explain in detail
- We will first show how to
  - log in: SIGNON
  - open an account: OPEN
  - register articles: ARTREG
  - close the account: CLOSE
  - pay the bill: TRANS TM_BANK
- Then we will hit the button

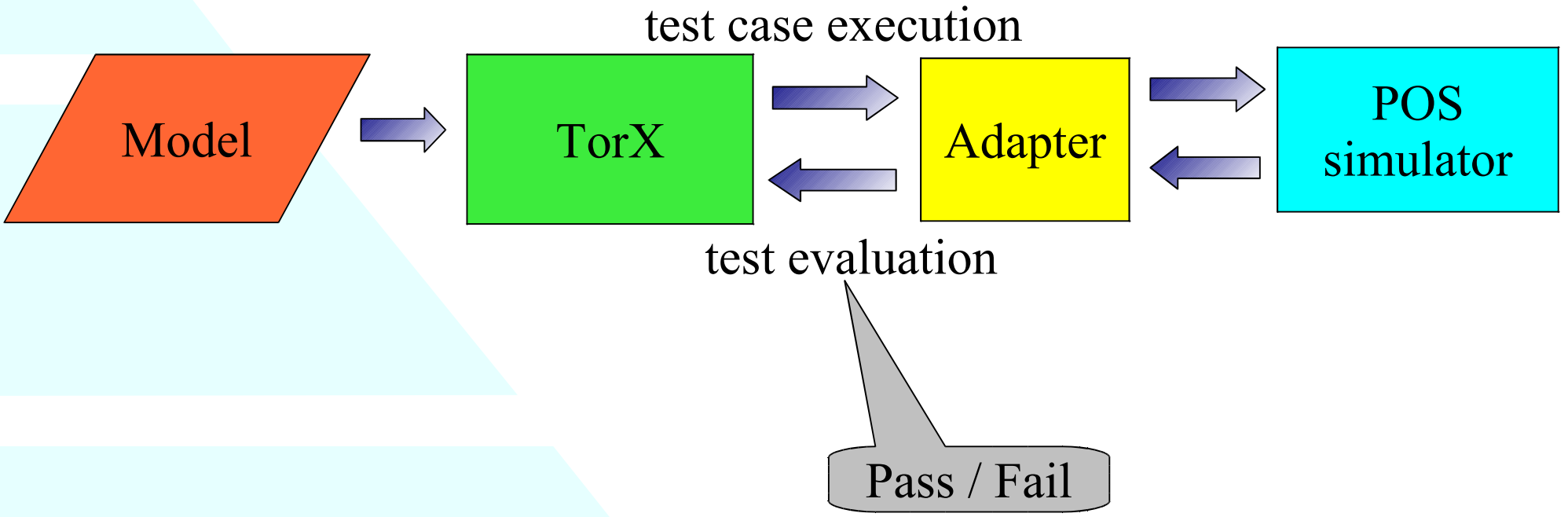
State Machine: Point Of Sale (POS)



Model snippet

```
as_idle:
if
:: receive(OPEN);
     send(C231_ACCOUNT_OPENED, &accountnr);
     goto as_open;
:: receive(SIGNOFF);
     send(C250_SIGNEDOFF);
     goto ss_off;
:: receive(GET, CS_ACCNT);
     send(C210_VAR_RETURN, CS_ACCNT, AS_IDLE);
fi;
```

Model Based Testing with TorX



TorX

- Stimuli
- Responses
- Interaction diagram

DEMO

QUESTIONS SO FAR?

Lessons learned/wishes

- When to stop testing?
- What is tested?
  - Test scenarios
  - Individual tests
- Checks outside the model, for example syntax checks
- Continue testing after the detection of an error
- Sunny day versus Rainy day

- Data, data, data more data!

Conclusion

- Model Based Testing
  - Coverage, coverage, coverage
  - Quick and cheap to repeat
- Disambiguates specification
- Suitable for
  - Systems that are expensive/complex to test by hand
  - Systems that are expensive to fail
  - Regression testing

Questions?