Yet Another Smart Process EditoR

Kees van Hee Reinier Post Lou Somers

Architecture of Information Systems
Department of Mathematics and Computer Science
TU Eindhoven

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Outline of this talk

1. The need for Yasper
   - Petri nets for process modelling
   - Why create Yasper?
2. A closer look at Yasper
   - Yasper's modelling features
   - Simulation in Yasper
   - Implementation notes
3. Integration
   - Yasper and other tools
4. Conclusion

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Systems modelling

Our main interests:

- business process modelling
- software systems modelling

An adequate modelling technique is

- clear
- powerful
- exact
- well-supported

Process modelling

Process modelling must express concurrency / cooperation.

Petri nets are adequate,
but need better support.

Most processes are *workflow nets*:
with fixed start and end points.

Yasper

Why Yet Another Smart Process EditoR?

Many Petri net tools exist,
mostly in the academic world.
Our past contribution: the ExSpecT coloured Petri net tool.

Reasons to create another tool, Yasper:

- make workflows easy to simulate
- make Petri nets more palatable (for industry)
- Microsoft integration via .NET (for industry)
- integrate with other tools

Use cases for Yasper

- *project: Deloitte Industry Prints:*
  - "best/standard practices" business process models
  - used by Deloitte consultants
  - without a good modelling technique
  - ⇒ many ambiguities and plain errors
- *project: OGO 2.2:*
  - business software modelling/prototyping project
  - part of computer science curriculum
  - previously done with ExSpecT
- *many other uses*

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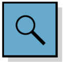
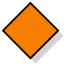
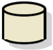
Modelling features: overview

basic Petri net elements

element	notation	description
place	○	condition or resource
transition	🟩	event or action
arc	→	process flow
token	⚄	(object in a) condition

Modelling features: overview

general purpose extensions

element	notation	description
subnet		spread across multiple pages
xor		choice (split / join)
role	(-)	executer / resource
store		data involved
inhibitor	———●	negative condition (no tokens)
reset	- - - - - -	clear condition (clear tokens)

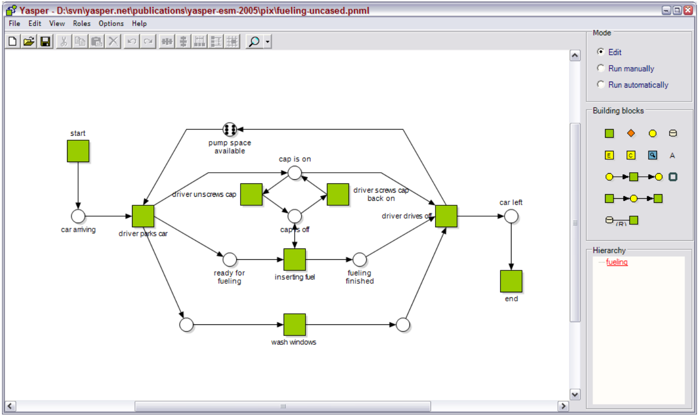
Modelling features: overview

extensions for automatic simulation

element	notation	description
time	◙	processing time
cost	(-)	processing cost
case	🟡	preserves workflow case
emitor	E	generates workflow case
collector	C	terminates workflow case

A basic Petri net

places, transitions, arcs, tokens



Yasper - D:\svn\yasper.net\publications\yasper-esm-2005\pix\fueling-uncased.pnml

Mode

● Edit

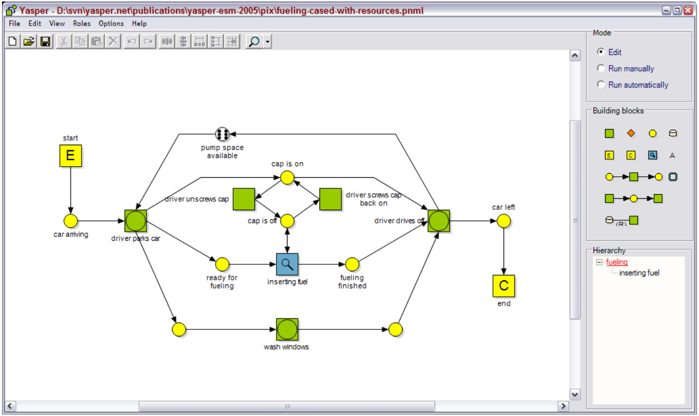
○ Run manually

○ Run automatically

Getting fuel at a petrol station

The net extended with Yasper features

exhibiting most of them



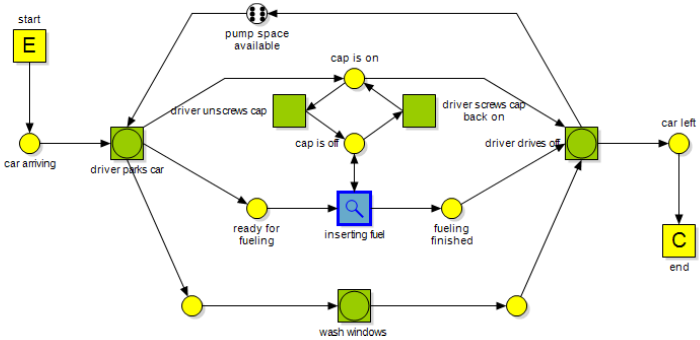
Yasper - D:\svn\yasper.net\publications\yasper-esm-2005\pix\fueling-cased-with-resources.pnml

Mode
● Edit
○ Run manually
○ Run automatically

Getting fuel, with more accuracy

Extension: subnets

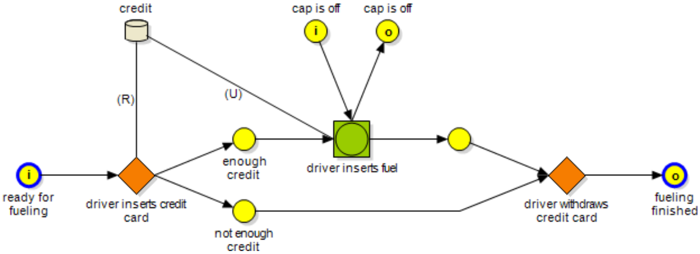
spreading content over multiple pages



A subnet element

Extension: subnets

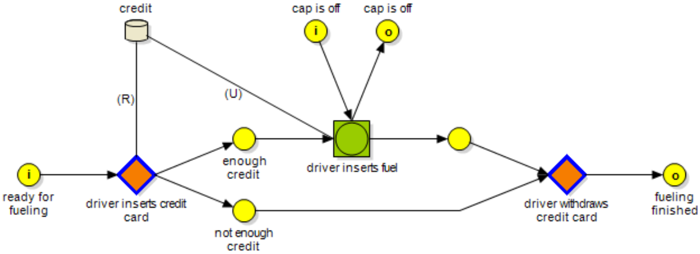
spreading content over multiple pages



The interface: references to places outside

Extension: choice

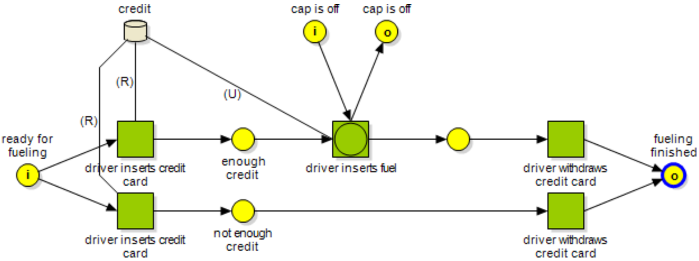
as known from flowcharts, UML activity diagrams



Choice elements indicate alternatives

Extension: choice

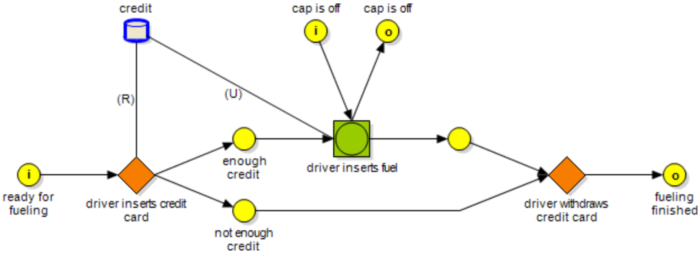
as known from flowcharts, UML activity diagrams



A basic Petri net equivalent

Extension: stores

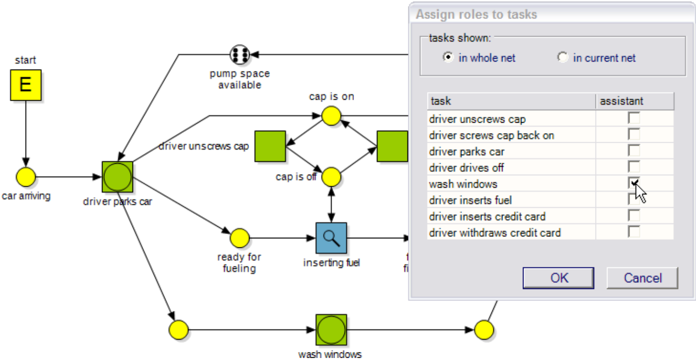
indicate (not simulate) data manipulation



Stores: data involved in transitions

Extension: roles

executers / resources



Assign roles to tasks

tasks shown:

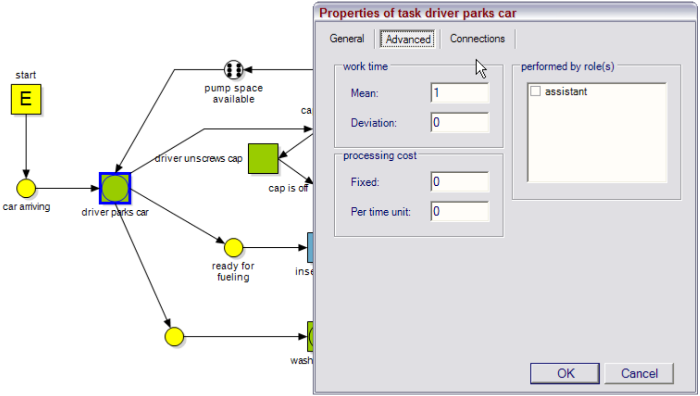
● in whole net ○ in current net

task	assistant
driver unscrews cap	□
driver screws cap back on	□
driver parks car	□
driver drives off	□
wash windows	☑
driver inserts fuel	□
driver inserts credit card	□
driver withdraws credit card	□

Transitions can be executed by roles

Extension: transition time and cost

fixed or stochastic



Properties of task driver parks car

work time

- Mean: 1
- Deviation: 0

processing cost

- Fixed: 0
- Per time unit: 0

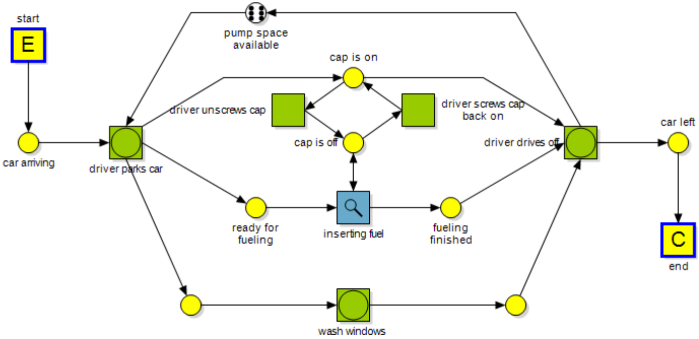
performed by role(s)

- □ assistant

Time and cost assignments (for automatic simulation)

Extension: workflow cases

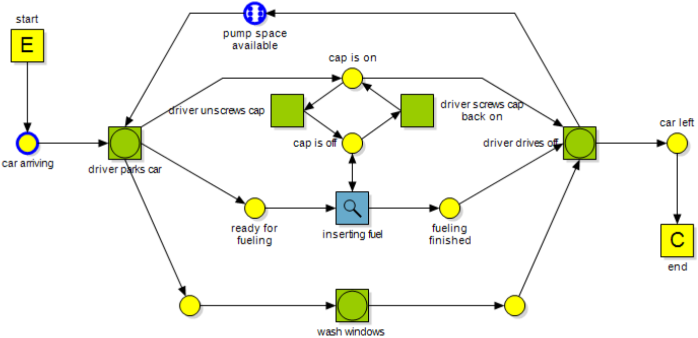
case sensitive places, emitors, collectors



Emitors and collectors mark start and end of workflow

Extension: workflow cases

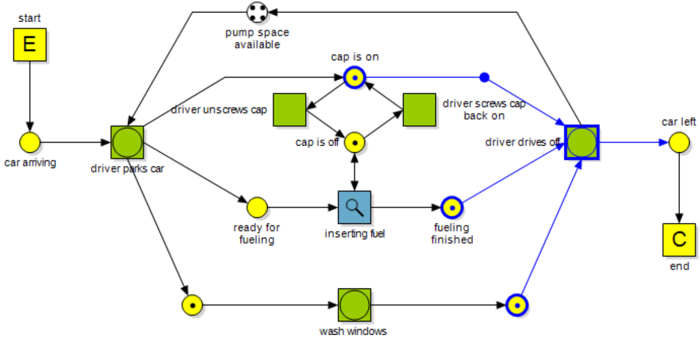
case sensitive places, emitors, collectors



Case sensitive vs. case insensitive places

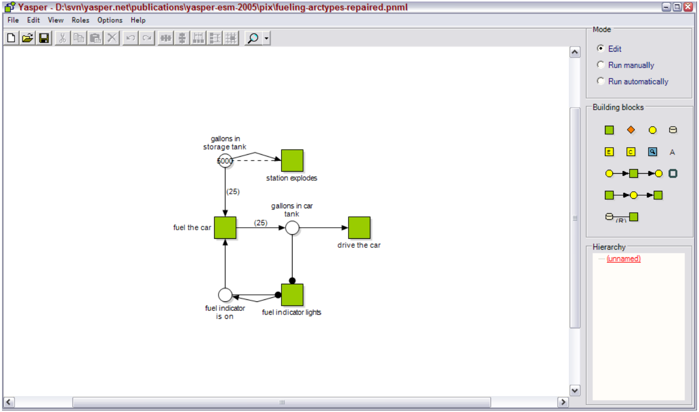
Extension: workflow cases

case sensitive places, emitors, collectors



Transitions match cases on input places

Extension: special arc types



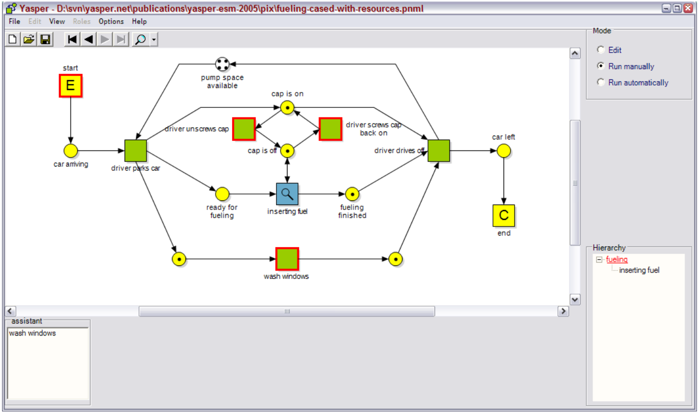
Yasper - D:\svn\yasper.net\publications\yasper-esm-2005\pix\fueling-arctypes-repaired.pnml

Mode

- ● Edit
- ○ Run manually
- ○ Run automatically

An example with more complex flow logic

Manual simulation in Yasper

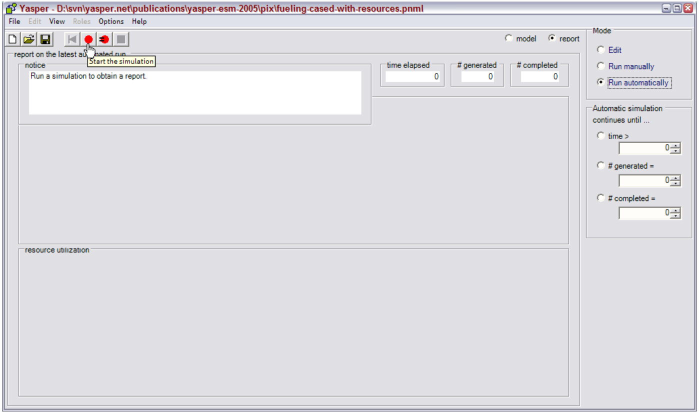


Yasper - D:\svn\yasper.net\publications\yasper-esm-2005\pix\fueling-cased-with-resources.pnml

Mode
○ Edit
● Run manually
○ Run automatically

Playing the token game in the diagram

Automatic simulation in Yasper



Yasper - D:\svn\yasper.net\publications\yasper-esm-2005\pix\fueling-cased-with-resources.pnml

○ model ● report

report on the latest automated run

notice

Run a simulation to obtain a report.

time elapsed	# generated	# completed
0	0	0

resource utilization

Mode

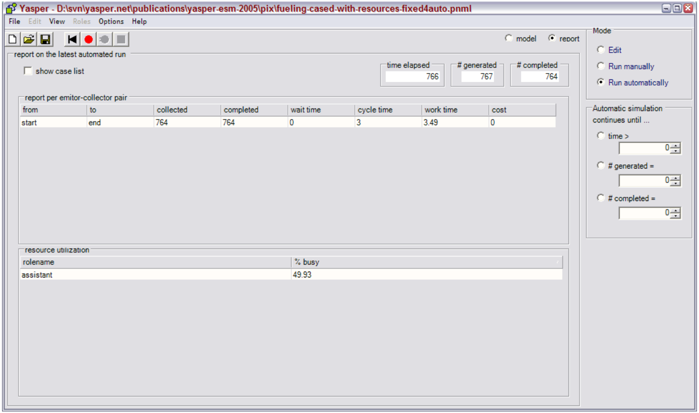
○ Edit
○ Run manually
● Run automatically

Automatic simulation continues until ...

○ time > 0
○ # generated = 0
○ # completed = 0

Starting an automatic run

Automatic simulation in Yasper


Yasper - D:\svn\yasper.net\publications\yasper-esm-2005\pix\fueling-cased-with-resources-fixed4auto.pnml
File
Edit
View
Roles
Options
Help

○ model ● report

Mode

○ Edit
○ Run manually
● Run automatically

report on the latest automated run

□ show case list

time elapsed: 766
# generated: 767
# completed: 764

report per emitor-collector pair

from	to	collected	completed	wait time	cycle time	work time	cost
start	end	764	764	0	3	3.49	0

Automatic simulation continues until ...

○ time > 0
○ # generated = 0
○ # completed = 0

resource utilization

rolename	% busy
assistant	49.93

The report

Yasper makes simulation work

In Yasper, simulations are

- based on exact execution semantics
- very easy to set up and run

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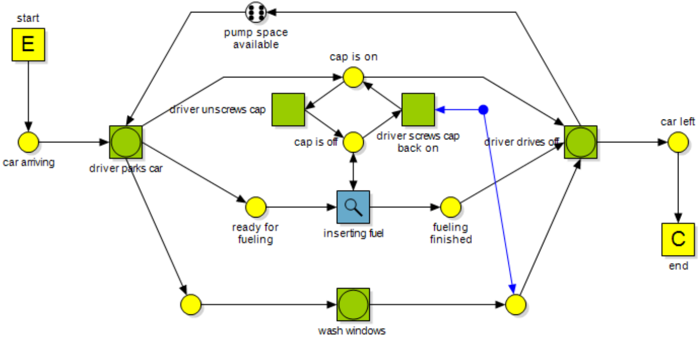
Automatic simulation demonstrates errors

and with alarming frequency, too



An error repaired

Simulation makes Yasper work

In Yasper, simulations

- immediately pinpoint most modelling errors
- pinpoint deadlocks / bottlenecks in the process itself
- can estimate overall throughput and efficiency

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Software platform

the choice for .NET

Many Petri net tools exist; few are for .NET.
.NET = Microsoft's Java equivalent:

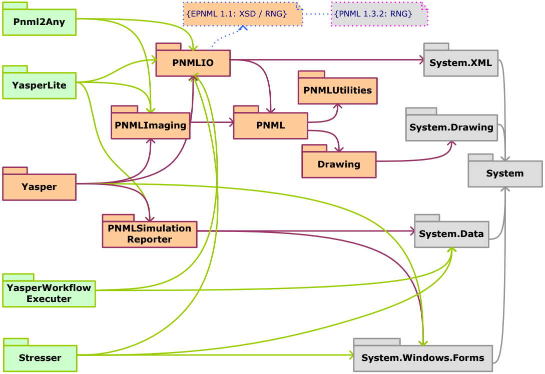
- (good languages, libraries, and IDE)
- Microsoft integration (SQL Server, Office, GUI)
- more acceptable to industry (Deloitte)

Drawback:

- less portability (no Yasper on Linux)

Architecture

Yasper's library dependencies



Availability

Yasper is partly free:

- Yasper program completely free to use
  (but don't sue us when it breaks)
- code not free
  (but talk to us when you want it)

Get Yasper from www.yasper.org

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Development strategy: integration

Yasper's design philosophy:

- do not compete with other tools trying to duplicate their features
- work with them instead by translation / calling

Areas of integration

- *the use of data ("color"):*
  interface Yasper with a "data manager"
- *Petri net model checking / verification:*
  interface Yasper with analysis tools
- *non-Petri net modelling techniques:*
  supply translations from/to Yasper

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Methods of integration

- *reuse of code libraries:*
  see architecture diagram above
- *common file formats*
  PNML, extended PNML

Examples of integration

- analysis tools, e.g. Woflan, INA
- workflow engine (Yasper/InfoPath)
- simulation-only (with BPMN modeller)
- process model translations (e.g. UML activity diagrams, ProVision, BPMN, BPEL, ARIS, μCRL)

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Findings

- Yasper simplifies Petri-net based modelling and simulation
- Yasper's simulation is of great benefit in modelling
- integrating tools is hard, but pays off

Ongoing/future work on Yasper itself

Provide more convenient editing:

- larger nets
- transformations
- consistency checks

Ongoing/future work on integration

- continue with workflow engine (Yasper/InfoPath)
- more process model translations
- better feedback from analysis tools
- Petri net transformation and generation
- process model repository
- etc.

Thank you

- *Maarten Leurs*
  - lots of Yasper programming
  - applying Yasper at Deloitte
- *Andries van Dijk*
  - support at Deloitte
- *Olivia Oanea, Ivo Raedts, Jan Martijn van der Werf*, a.o.
  - using Yasper, making suggestions, bug reports
  - writing related software
  - help with this presentation
- *Till Tantau*
  - the LaTeX beamer package
- *this audience*
  - any feedback you have