

Charlie - an Extensible Petri Net Analysis Tool

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Clermont-Ferrand, France

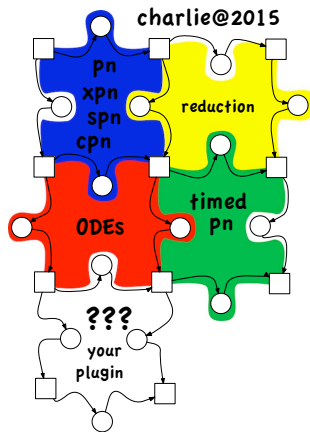


*L'Europe s'engage en
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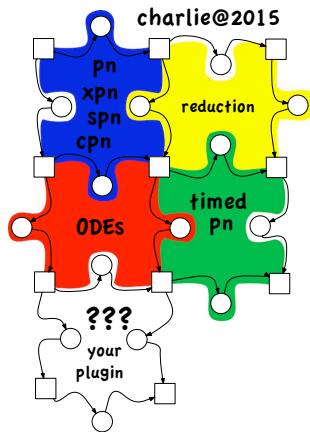
Projet co-financé par l'Union européenne

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- 1 Introduction
- 2 Functionalities
- 3 Plugin System
- 4 Summary

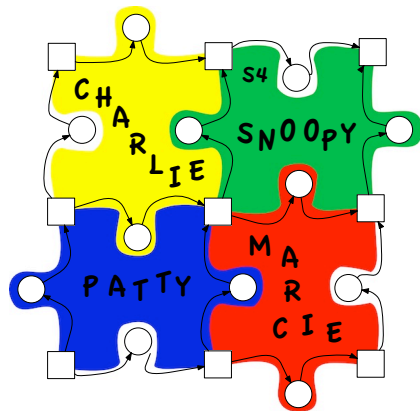


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Charlie – Background

- **2006** – tool development starts
- member of a tool family



*Snoopy [Petri Nets 2012],
Marcie [Petri Nets 2013],
S4 [Petri Nets 2014]*

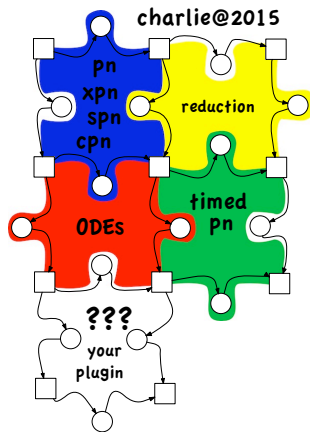
Charlie is a tool for **analyzing** (extended) place/transition Petri nets

- written in **Java** using **threads**,
- intuitive and easy to use **GUI** and **CLI**,
- reads several **file formats**,
- analyses several **structural and behavioural properties**,
- a **rule system** may conclude properties,
- extensible by a **plugin mechanism**.

Charlie is *not* a tool for

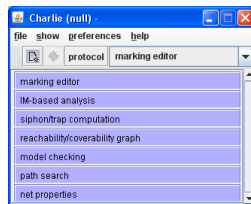
- *constructing*, or
- *simulating* Petri nets.

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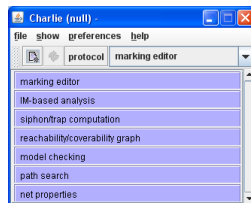
Charlie – Main Features

- reads Petri net files
 - created by Snoopy,
 - INA's PNT files,
 - ANDL (Abstract Net Description),
 - APNN (Abstract Petri Net Notation),
 - Petri Net Markup Language (PNML) is in preparation, and
 - your file format (by the plugin system).
- analysers
 - incidence matrix analysers,
 - siphon/trap computation,
 - reachability/coverability graph,
 - CTL/LTL model checking,
 - path search.
- rule system.



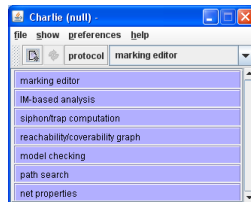
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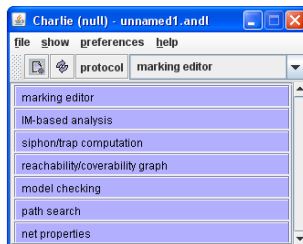
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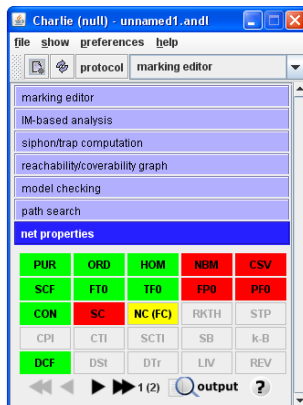
Charlie – GUI

- Clicking on a tab, opens the panel
- Starting an analyser opens the analyser thread manager (pause/resume/stop the analysis, statistics)
- Each analyser has its own thread(s)



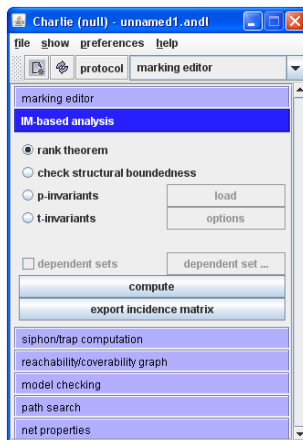
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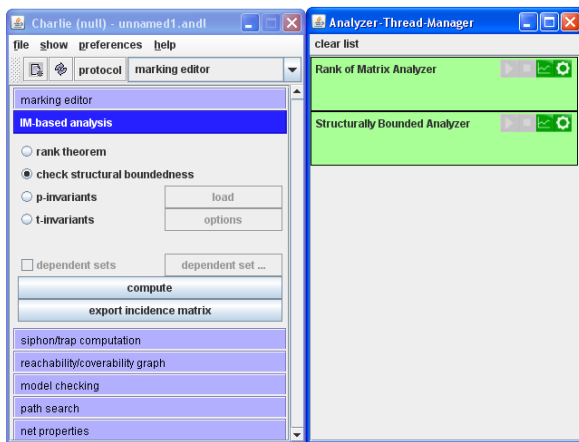
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Charlie – Rule System

Analysers may take a lot of time, but applying theorems (rules) to the current set of properties may retrieve results without any computation.

If the current properties imply another property, Charlie's rule system detects it.

Every Petri net which is structurally conflict free (SCF) is also dynamically conflict free (DCF).

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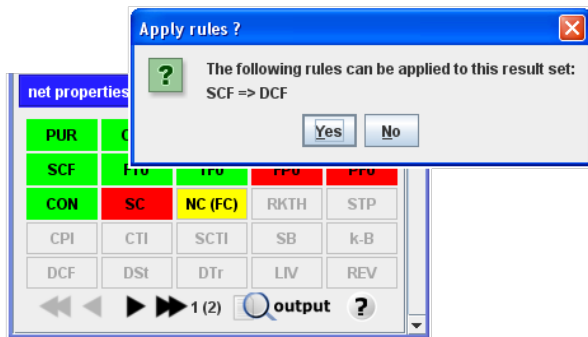
The screenshot shows a window titled "net properties" with a grid of 15 cells. The cells are color-coded: green for PUR, ORD, HOM, SCF, FT0, TF0, CON, and DCF; red for NBM, CSV, FP0, PF0, SC, and STP; yellow for NC (FC); and grey for RKTH, SBT, CTI, SCTI, SB, k-B, DSt, DTr, LIV, and REV. The bottom of the window has navigation arrows, a "1 (2)" indicator, a search icon, the text "output", and a question mark icon.

net properties				
PUR	ORD	HOM	NBM	CSV
SCF	FT0	TF0	FP0	PF0
CON	SC	NC (FC)	RKTH	STP
CPI	CTI	SCTI	SB	k-B
DCF	DSt	DTr	LIV	REV

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The screenshot shows the Charlie rule system interface. It features a 'net properties' table with a grid of colored cells representing different properties. A dialog box titled 'Apply rules?' is overlaid on the table, displaying a question mark icon and the text 'The following SCF => DCF'. The table below has a search bar with 'output' and a magnifying glass icon, and a '1 (2)' indicator.

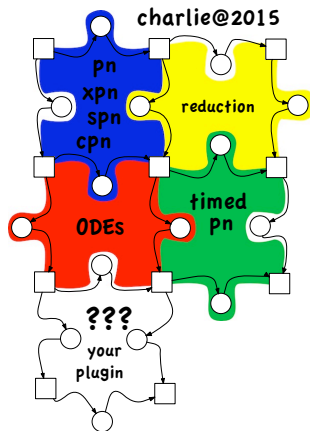
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- Charlie contains about 10 analysers, and Charlie's rule system contains more than 20 rules.
- But does it contain Analyzer *A* and Theorem *XY*?
- Hopefully *YES*, but probably *NO*.
- However, Charlie can be extended ...

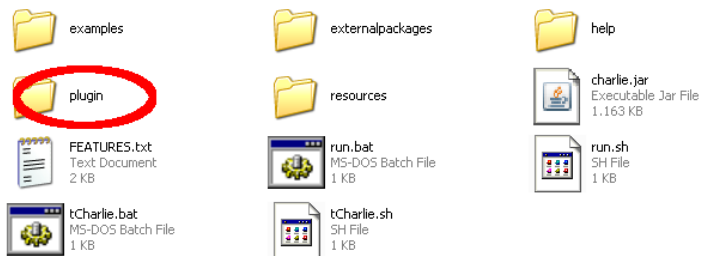
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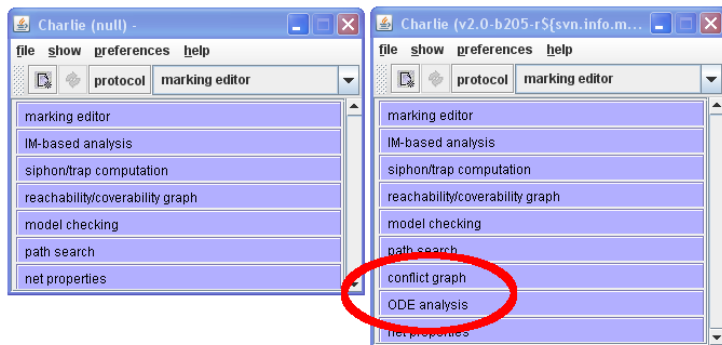
Charlie – Extensible Functions

- All main functionalities of Charlie can be extended by plugins:
 - file formats,
 - analysers,
 - set of rules.
- Easy installing of plugin: copy the plugin to the plugin folder.



Charlie – Plugins Look and Feel

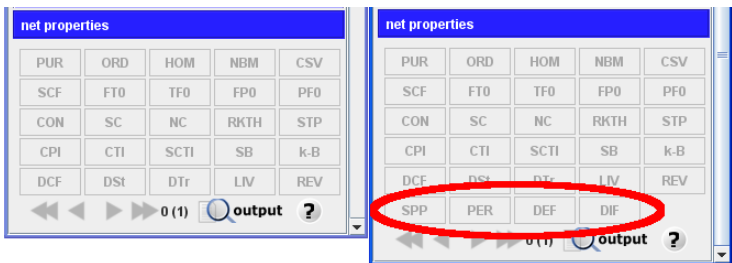
Plugins are smoothly integrated into Charlie: the analysers, new properties, new rules, and file format readers are automatically applied in the background.



Note: new rules can build on predefined properties (e.g., SCF) as well as own properties.

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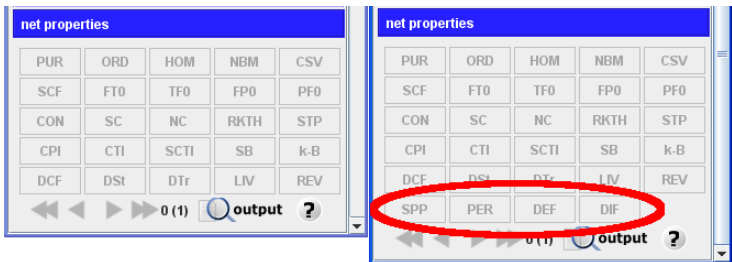
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Interested in writing your own plugin?

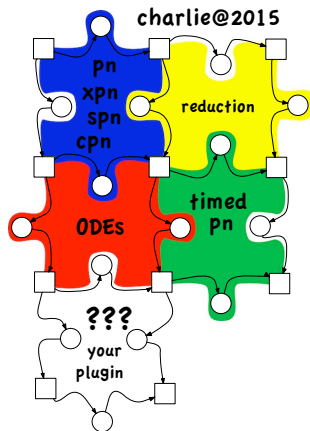
- J Wegener, M Schwarick and M Heiner:
A Plugin System for Charlie;

Proc. International Workshop on Concurrency, Specification, and Programming (CSP 2011), Biaystok University of Technology, ISBN: 978-83-62582-06-8, pages 531-554, September 2011.

- demo sources at

<http://www-dssz.informatik.tu-cottbus.de/DSSZ/Software/Charlie>

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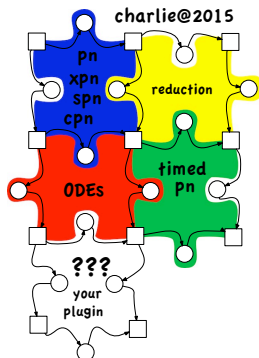


Charlie – Summary

- Charlie is a thread-based Java application
⇒ available on all major OSs (Windows, MacOS, Linux, ...)
- Charlie is available free of charge for academic use from
<http://www-dssz.informatik.tu-cottbus.de/DSSZ/Software/Charlie>
- Charlie is a powerful Petri net analysis tool which is
 - easy to **download**,
 - easy to **install**,
 - easy to **use**, and
 - easy to **extend**.
- *There is no error-free software:* please send your bug reports to charlie@informatik.tu-cottbus.de



Thank You



*Interested in a tool demonstration?
– Just contact us!*