

A hint of existing information systems analysis

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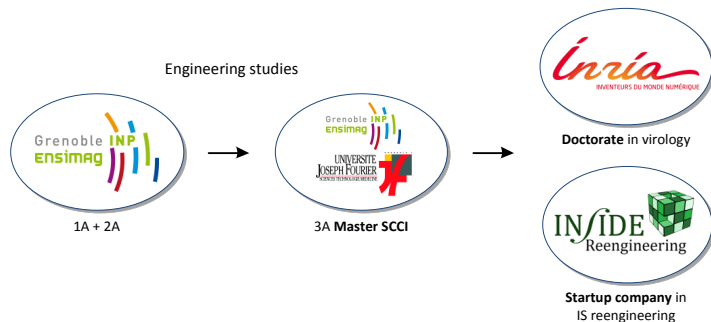


Co-Founder of



Master SCCI 10th Birthday, 12th September 2011

Timeline



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Career
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Motivation

Virology research
Goal
A simple game
A more subtle game

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Reengineering
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Existing information systems analysis

Motivation

One particular interest for *existing information systems analysis* :

- ▶ Handling complex, very informative, human-related systems
- ▶ No documentation
- ▶ From a practical point of view, standard methods & tools do not suffice.

Two activities:

- ▶ Fundamental research in *computer virology*
- ▶ Co-founding of a startup company, INSIDE Reengineering, specialized in information system reengineering.

Virology research

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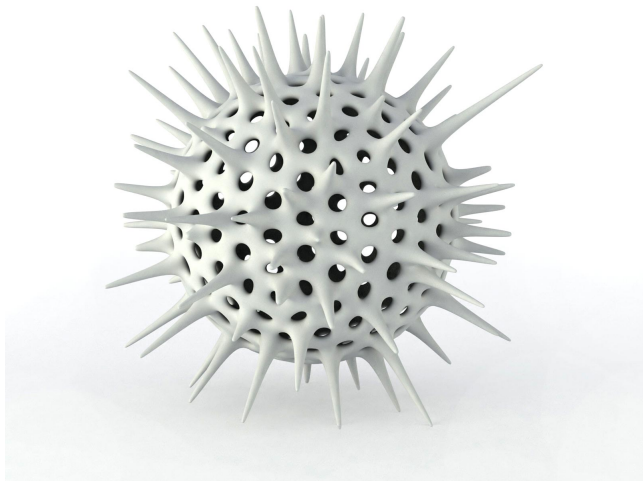
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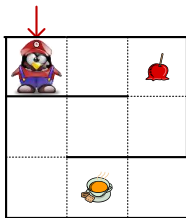


- ▶ INRIA Nancy - Grand Est, Team CARTE
- ▶ A study of the ambiguous nature of software (particularly malware), because of:
 - ▶ Implementation language (assembler x86)
 - ▶ Mass information, execution context dependency
 - ▶ Self-modification/self-organization (capability of a program to modify/reorganize itself at execution)
 - ▶ Programming tricks (security flaw exploits, deep system features, designer experience).
- ▶ Ideally, we want to recover from binary files (e.g. compiled programs) a *control flow graph* (also called flowchart) upon which we base malware detection.

Basic rules

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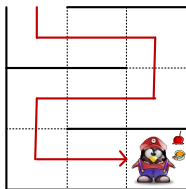
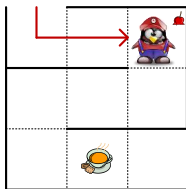
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Rule #1

The player moves forward
and collects objects.

The only possible solution (execution trace):



Control flow graph



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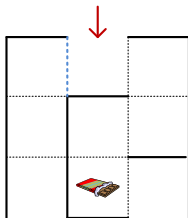
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Doors

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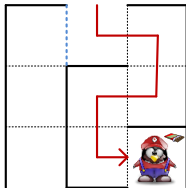
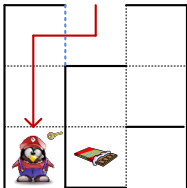


Rule #2

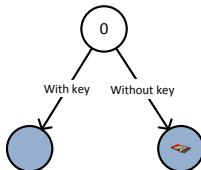
Door: when the player has the key, he must pass the door. Otherwise, he goes in the opposite direction.

Door \approx direct branching

Two possible solutions:



Control flow graph



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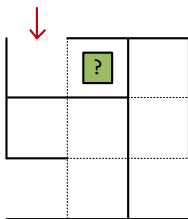
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More sophisticated rules

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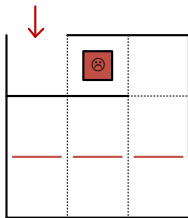
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Rule #3

Teleporter: the player moves to a cell depending on the objects he has collected.

Teleporter \approx indirect branching

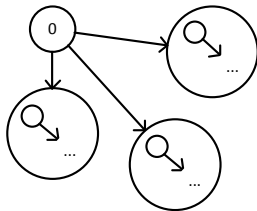
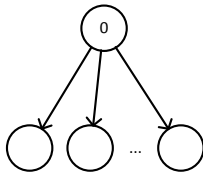


Rule #4

Trap: makes some walls move, depending on the objects he has collected.

Trap \approx self-modification

Control flow graph



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Managing what is unexpected

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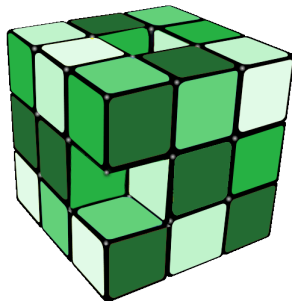
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Rule #0

What if objects were appearing/disappearing through time ?

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- ▶ Emerging startup company founded by Patrice WŁOKA (20 years engineering & reengineering experience) and Stéphane WŁOKA in Nancy.
- ▶ Laureate of “Entreprendre 2011” in emergence category.
- ▶ INSIDE Reengineering uses internal *software/document reengineering* and *applied software engineering* methodologies to provide an *enlightenment* to its client.
- ▶ Personal contribution: R&D management.
- ▶ KW: High Tech - Professionalism - **Performance**

“Comprendre pour mieux construire”

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What kind of information system ?

- ▶ Hardware, software, human resources, industrial process
- ▶ *Any organized set which regroup, classify, compute and broadcast information on a given environment.*

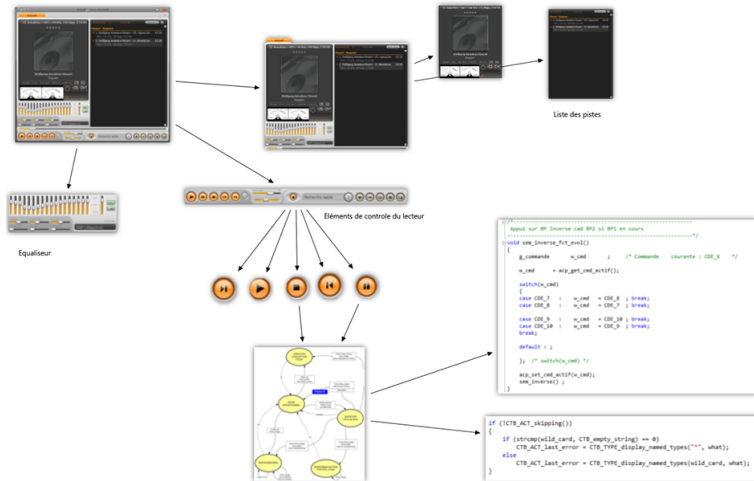
What tools ?

- ▶ An ontological schema: a schema that classifies and gives semantics to information by the mean of objects and relations between objects (implemented in INSIDE Workshop).
- ▶ Automatic shape recognition (implemented as a module of INSIDE Workshop).
- ▶ Research-oriented languages (Lisp, Prolog, OCaml, F#), compiler compilers, finite state automata.

Ontological schema: example

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Methodology (in French)

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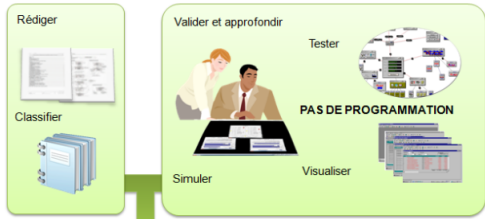
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Quelques résultats : la logique interne était le résultat d'un audit minutieux et d'un cahier des charges très précis (voir schéma)
L'effort avait été porté sur l'assistance durant la saisie (doc tech)

Réécriture du logiciel en s'appuyant sur l'expérience acquise et l'investissement déjà consenti.

Gain substantiel

Ces études peuvent être étendues à tout le système d'information jusqu'à l'outil de production

Gain de productivité

Réévaluation du patrimoine de l'entreprise ...

La richesse n'est pas que dans les immobilisations !

To conclude

- ▶ One passion, two activities.
- ▶ Cryptography & reengineering: different goals but same spirit (reengineering \simeq information system cryptanalysis).
- ▶ Master SCCI: excellent culture of scientific research, system administration and security business.

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Questions

- ▶ Thank you for your attention. Questions ?
- ▶ Contact: stephane.wloka@inria.fr

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