INSA INSTITUT NATIONAL DES SCIENCES APPLIQUÉES RENNES

Computer Science Department

Ch 0 – Course presentation

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Rennes capital of Brittany and city of over 400 000 inhabitants

Rennes is the:

- 11th largest city in France
- 2nd city in France for its student population

Rennes is situated:

- 45 minutes from the sea (Saint-Malo)
- 1,5 hours from Paris

Rennes is a university and research hub of international importance in 3 sectors :

- Health
- Digital Technology
- Eco-activities

INSA Rennes in a few figures

Excellent scientific training

- 8 Masters of Science and Engineering programs, 2 co-operative education Masters of Science and Engineering programs
- 10 Masters of Science programs
- 3 doctoral schools

Cutting edge scientific research

- 6 research laboratories
- 1 technology platform

International prestige

- 150 cooperation agreements in 45 countries
- International double diplomas
- 100% international mobility per cohort

Close cooperation with companies

- Partner Companies Club
- INSA Rennes Engineers' Association (AIIR)
- Promotion sponsorship, internships, job forums, etc.

An equipped and lively campus

- 1000 rooms and studio apartments
- 1 restaurant
- 30 clubs and associations

Key figures 2021-2022

2 054 students

- 1 830 engineering students / 83 apprenticed and 134 in Double Diploma INSA – Sciences Po Rennes
- 72 Master of Science students
- 14 Advanced Masters students
- 10 Master of Science, Innovation and Entrepreneurship students
- 61 PhD students

- 548 Staff members
- 231 Academic staff
- 317 Professional & Technical staff

Erasmus+ program

- INSA Rennes is involved in exchange programs with Georgia since 2015
- Grants available in 2024-2025
  - 1 semester
  - master level
  - Strong GPA required
  - English or French language test
    - See TSU international office
  - 850€/month given by Erasmus
  - ~500€/month : cost of accommodation + restaurant
- If interested contact me and Magda Tsintsadze before applying (as early as possible)

Moodle page

- https://e-learning.tsu.ge/course/view.php?id=7963
  - Register as soon as possible to this page
  - make sure to receive the announcements
  - add a picture of yourself in your profile
- Eclipse Prolog help
- Lecture supports
- Exercises uploads
- Project support

Schedule

Experience shows that not attending all classes can be a problem

- 1+9 Face to face classes
  - Tuesdays, Wednesdays, Thursdays
  - From 25/03 to 11/04
  - 4pm-7pm
- Individual project
- Mid-term defense
  - Mid-May
- Debriefing seminar
  - end of May
- Final defense
  - mid-June

Eclipse Prolog

- System used during this course
- http://eclipseclp.org
- Some help on the Moodle page to start it
- SWI Prolog may also be used
  - https://www.swi-prolog.org
  - but some differences, in particular for tracing

Why learn a new programming paradigm ?

- Is this saw relevant for pruning ?
  - Yes...

  - But to a certain extent only
    - You can extricate your car
    - But it will take hours, you will be more likely to hurt yourself, ...

- If you address a problem with an inappropriate programming paradigm, even if you eventually manage
  - it will have taken too much time
  - or/and the program will be of poor quality
    - Bugs, poor performances, ...

Why Prolog ?

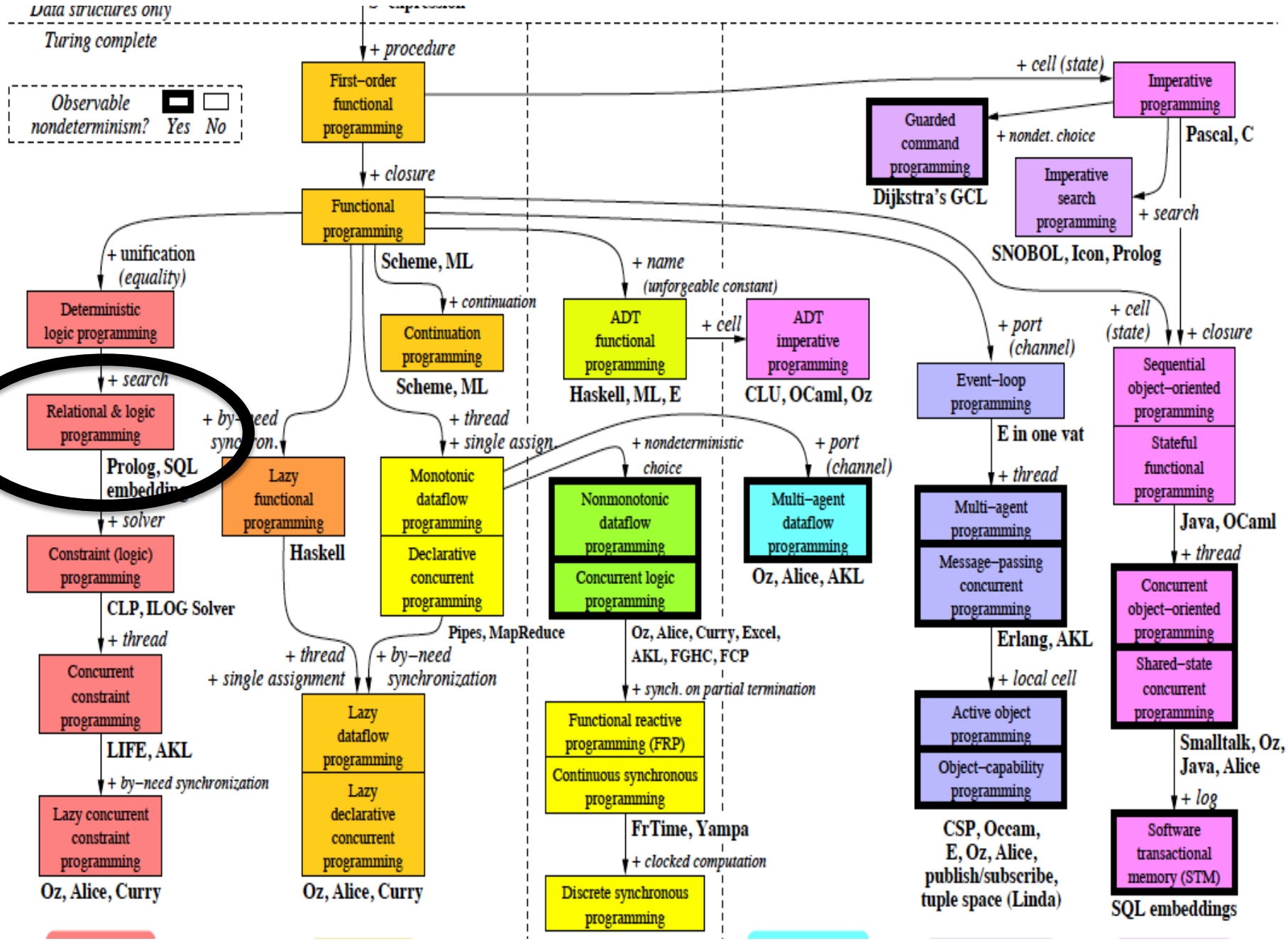
- A new programming philosophy
- Language relevant for
  - Knowledge management
  - Artificial intelligence (reasoning, planning, expert systems, games, etc.)
  - Automatic language processing
  - E-learning
  - Bioinformatics
  - Optimization, decision support
- Used in industry, in particular for its constraint programming aspect

Specificity of Prolog

- Logic =>
  - You specify **what** is true
  - You let the interpreter prove queries and build solutions for you
    - it handles **how** to do it

➢ Much less low-level aspects to care about

Ontology of programming paradigms (VanRoy 2009)



Assessment 1/3

- Based on an individual project
- Midterm intermediate individual defense
  - Mandatory
  - 30points
  - Mid-May
- Project code and Final individual defense
  - 70 points
  - 40 are required
  - Mid-June

➢ **You will explain your code**

Assessment 2/3

- Do NOT copy last year students codes
  - most of them were totally rubbish
- Do NOT copy on each other
  - **I will divide the grade by the number of identical codes**
- Do NOT use AI to generate the code
  - You will probably not understand what is produced
- The courses will give you all the necessary knowledge
  - Make all the exercises

Assessment 3/3

- In order to be able to take the exam you have to upload the exercises done during lecture
- See the Moodle page for recommendations.

PRELIMINARIES

Recursion is a key mechanism

Illustration: **Towers of Hanoi**

- Puzzle consisting of three rods and a number of disks of various diameters, which can slide onto any rod.
- The puzzle begins with the disks stacked on one rod in order of decreasing size, the smallest at the top, thus approximating a conical shape.
- The objective of the puzzle is to move the entire stack to the last rod, obeying the following rules:
  1. Only one disk may be moved at a time.
  2. Each move consists of taking the upper disk from one of the stacks and placing it on top of another stack or on an empty rod.
  3. No disk may be placed on top of a disk that is smaller than it

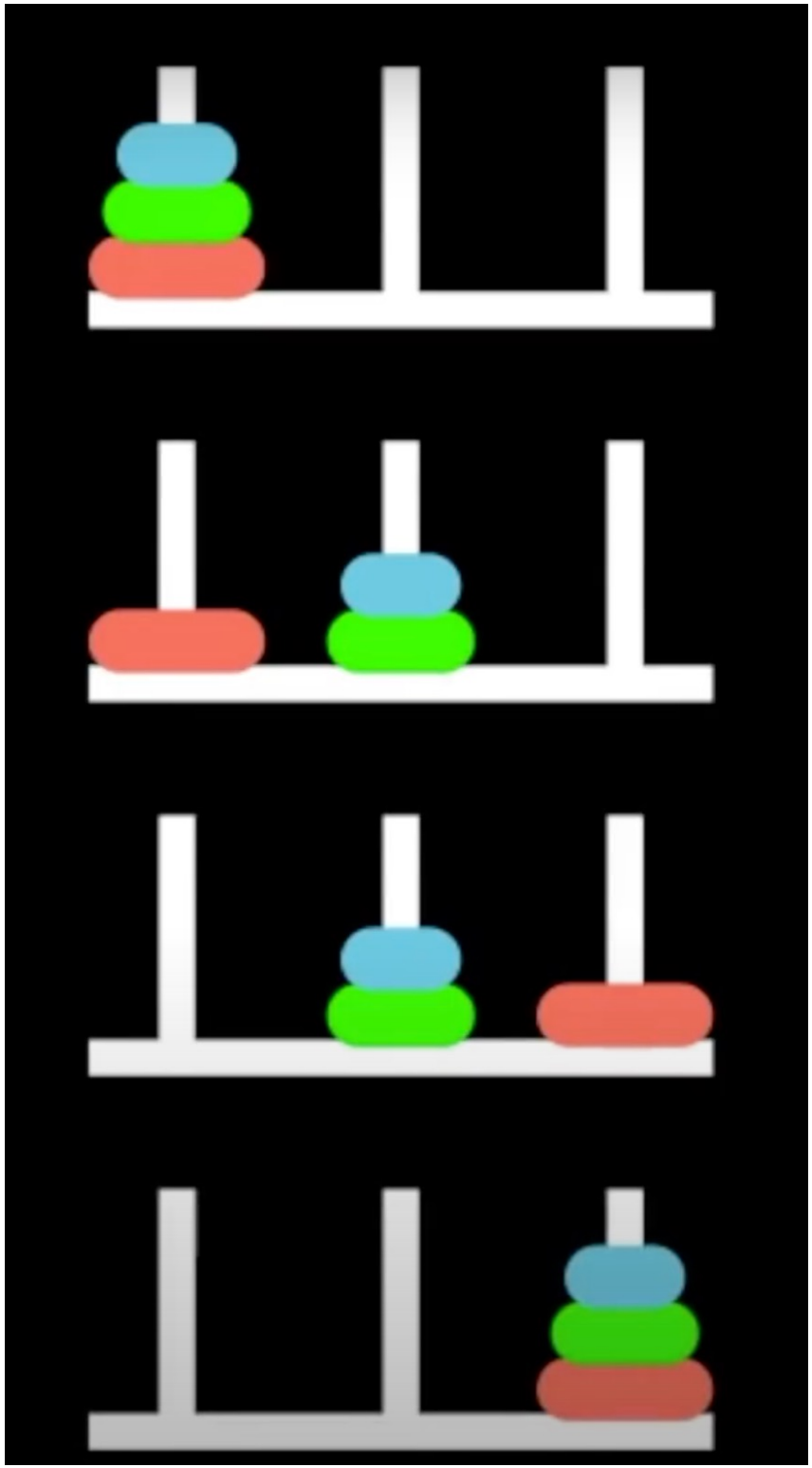
- You can practice here: https://www.mathplayground.com/logic_tower_of_hanoi.html
- Thanks to https://www.youtube.com/watch?v=rf6uf3jNjbo for the following illustrations

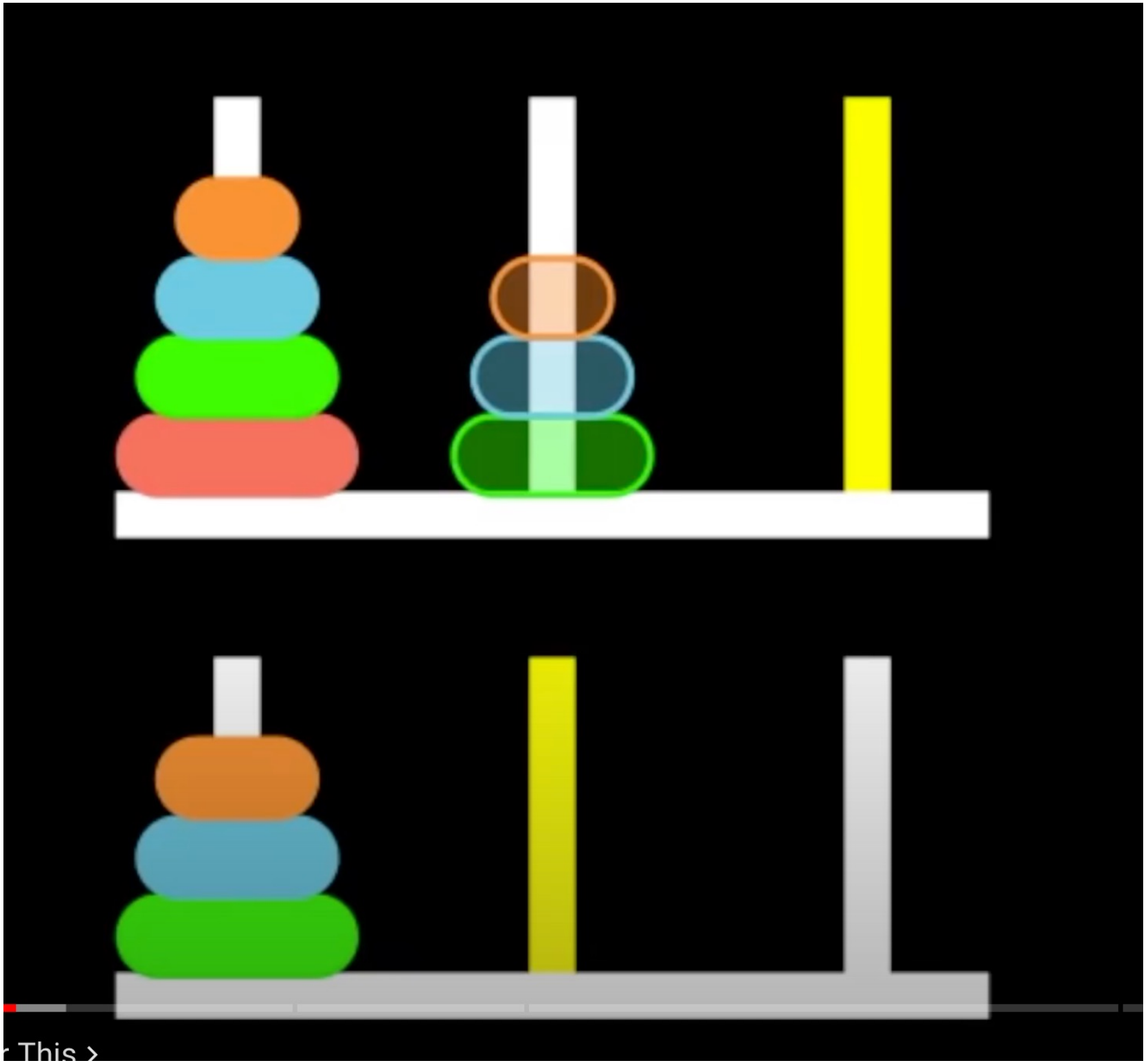
Initial problem

“recursive call”
reachable in 2 steps

move 1 disk

result reachable in 2
more steps





Acknowledgement

- Peter van Roy (2009):Programming Paradigms for Dummies: What Every Programmer Should Know. In G. Assayag and A. Gerzso (eds.) *New Computational Paradigms for Computer Music*, IRCAM/Delatour, France.
- Lean Sterling and Ehud Shapiro, The art of Prolog, MIT Press, 1999.
- Self teaching site : Learn Prolog now ! http://www.learnprolognow.org
- Free Systems
  - Eclipse Prolog : http://eclipseclp.org
  - SWI Prolog interpreter http://www.swi-prolog.org/