

TinyProlog: Logic programming language

How logic programming works

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Logic programming

- 📋 Declarative style - specify what, but not how
- ✅ Programs consists of **facts and rules**
- 💡 Evaluation by clever **inference engine**
- 🗄 Prolog, Datalog and basis of other systems
- 📖 Origins in AI and **natural language**

From inference to programming

Type inference

- Program analysis
- Generated constraints
- Unification of types
- Infer type assignment
- Unification + substitution

Logic programming

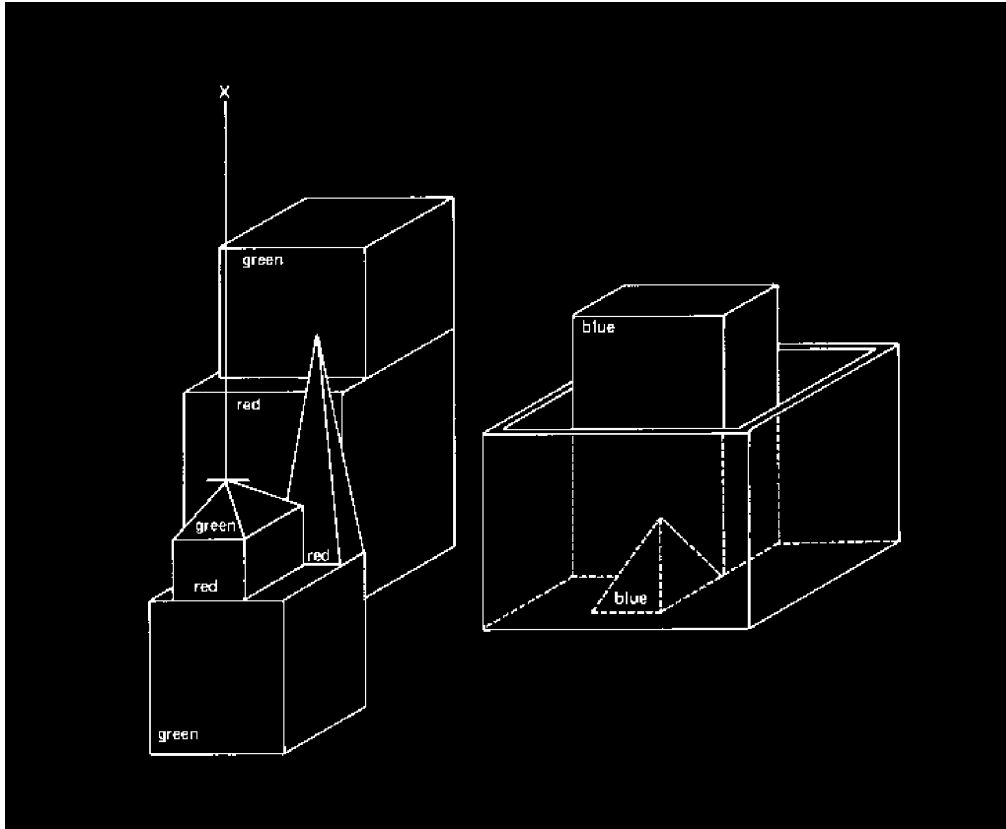
- Program evaluation
- Handwritten programs
- Unification of terms
- Infer variable assignment
- Unification + substitution

A bit of history

Natural language processing in the late 1960s & early 1970s

SHRDLU, PLANNER

"Find a block which is taller than the one you are holding and put it into the box."



Prolog then and now

Alain Colmerauer, Marseilles (1972)

- Natural language processing
- Automatic theorem proving

Fifth generation systems (1980s)

- 10 year initiative in Japan
- Epoch-making knowledge processing

Prolog and Datalog today

- Used in real-world in specialized domains
- Basis of many reasoning & solving systems



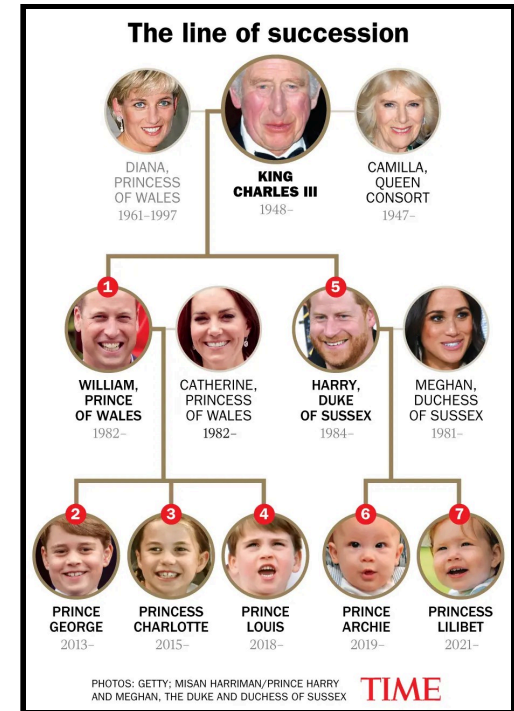
Prolog "Hello world"

Family tree querying

- Simple database querying
- Search for data patterns
- Grandparent (parent of a parent)
Father (parent who is male)

List processing

- Linked lists with "cons" and "nil"
- Matching lists with patterns
- Many functions become multi-purpose



Demo

Family tree and lists

Magic squares

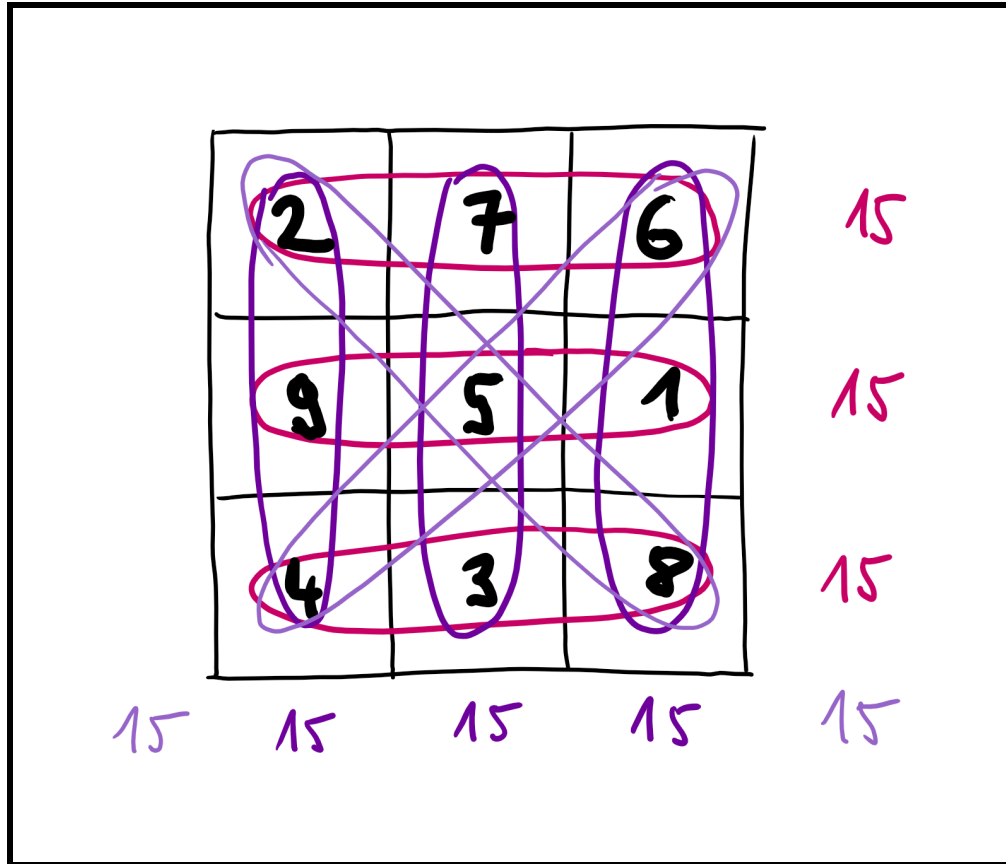
Naive method

Generate & test
all permutations

Better approaches

Try adding only
reasonable options

Naive is fine for us!



Demo

Generating magic squares