SECRET NINJA FORMAL METHODS

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MOTIVATION

High quality software

Correct
Robust
Reusable
Extendible

Using **formal methods**

Extensively
Seamlessly

FORMAL METHODS

"Formal methods refer to mathematically rigorous techniques and tools for the specification, design and verification of software and hardware systems."

– Ricky W. Butler, senior research engineer at NASA

BON

Assertions

Design by Contract

JML

TOOLS

Common JML tool suite

- Typechecker
- Compiler
- Runtime Checking Environment
- Documentation tool
- JUnit with JML

Ninja Advice

- **Hide** tools in the IDE

STATIC CHECKING

Runtime checking and testing are not enough

Extended **S**tatic **C**hecking / Java2

Null Pointer Exception
Class Cast Exception
Out of Bounds Exception

Integrated in the IDE

ADDITIONAL TOOLS

Moodle
GForge, Trac
Eclipse Plugins
SVN, Git

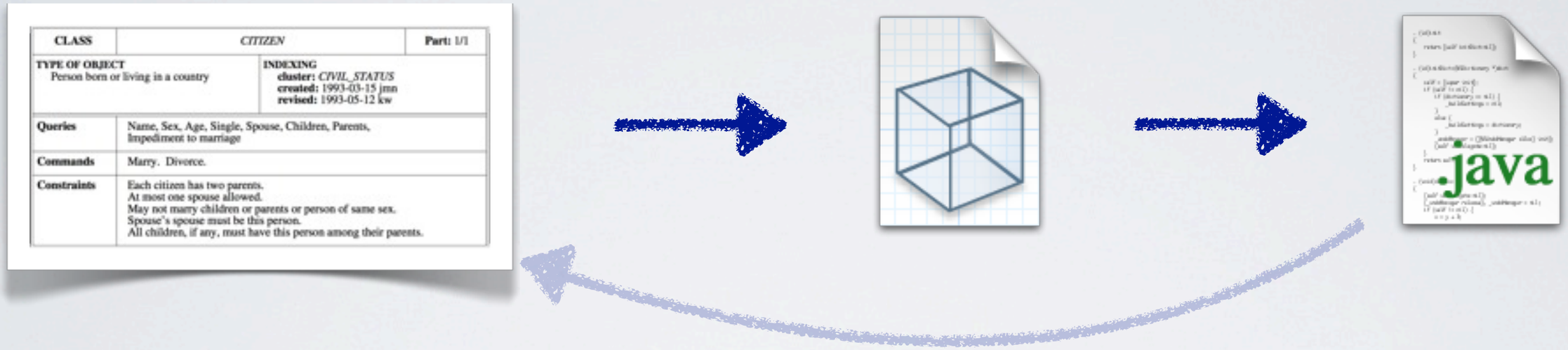
DESIGN & ANALYSIS FIRST

1. Define the system thoroughly
2. Build the system using formal methods

Use BON process together with
co-analysis and co-design

CLASS	*CITIZEN*	**Part:** 1/1
TYPE OF OBJECT Person born or living in a country	**INDEXING** **cluster:** *CIVIL_STATUS* **created:** 1993-03-15 jmn **revised:** 1993-05-12 kw	
Queries	Name, Sex, Age, Single, Spouse, Children, Parents, Impediment to marriage	
Commands	Marry. Divorce.	
Constraints	Each citizen has two parents. At most one spouse allowed. May not marry children or parents or person of same sex. Spouse's spouse must be this person. All children, if any, must have this person among their parents.	

DESIGN & ANALYSIS FIRST



Abstraction

Specification

Implementation

Think twice, build once - process

CONCLUSION

Proper tools setup
Deep integration with the language
Accompanied with thought-through process

High quality software using formal methods