Development of a Java Framework for Parametric Aircraft Design

The Performance Analysis Module

Relatori:
prof. Fabrizio Nicolosi
prof. Agostino De Marco

Candidato:
Vittorio Trifari
M35/411

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Introducing JPAD - Java Programs for Aircraft Design

- A software toolchain for aircraft preliminary design and MDO
- A modern, user friendly, modular framework.
- Support for simultaneous management/analysis of several aircraft and/or 'varied' configurations of the same aircraft.
- Conceived for collaborative design activities.
- Interoperability with other tools/disciplines (CAD/CFD/FEM analysis).

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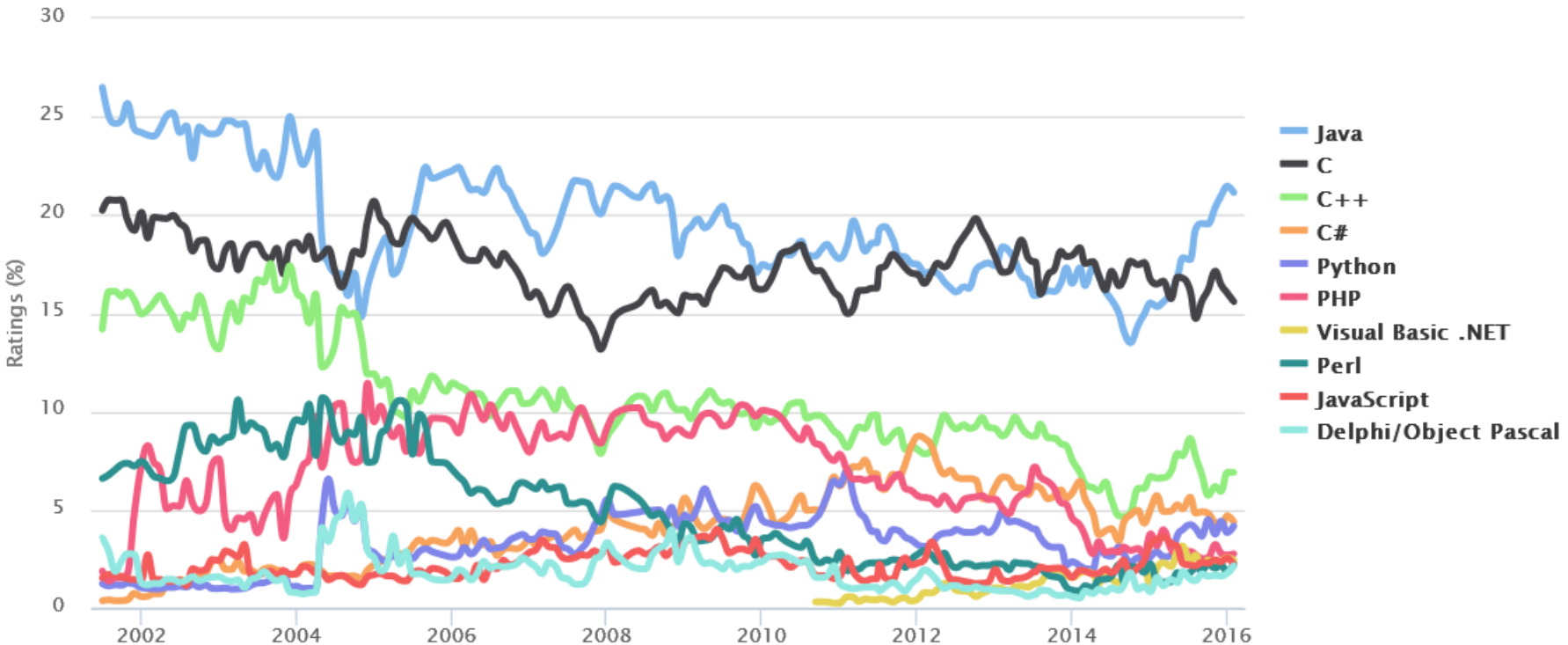
Main features

- Define parametric representations of a complete aircraft with XML configuration/input files.
- Generate CAD geometries of aircraft assembly and sub-components. Measure lengths, areas, volumes.
- Perform various types of analysis (L0, L0.5, L1): Aerodynamics, Stability & Control, Performance, Weight, Costs.
- Exports analysis results in XML and Excel formats. Produce useful output charts for each analysis.
- Perform iterative analysis in order to reach an optimum configuration. (*Work in progress*)

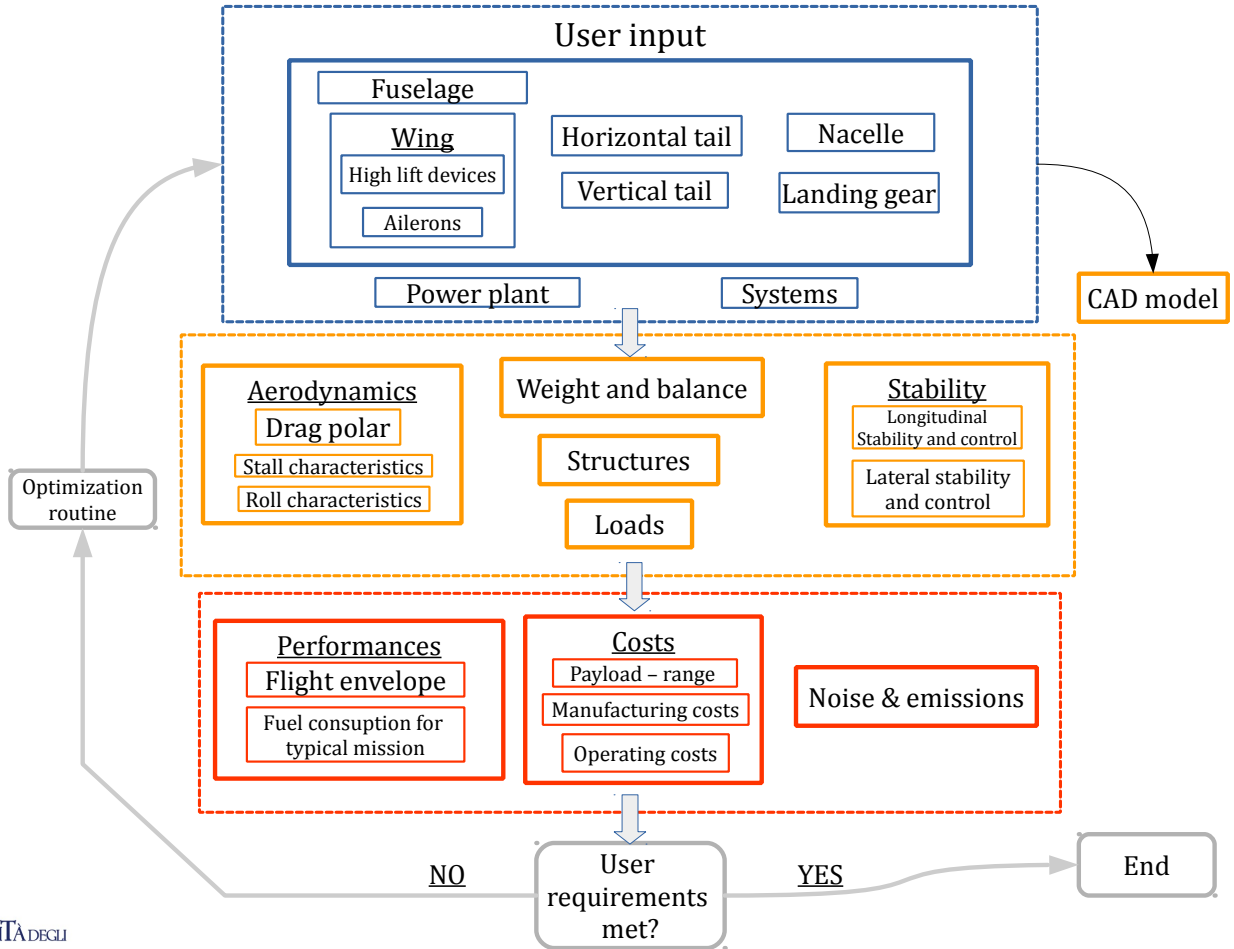
Java. Why?

- Language widely supported. This avoids the library to became obsolete due to the aging of the programming language used.
- The language promote the use of open source libraries, especially for I/O tasks and for complex mathematical operations.
- Widely supported GUI frameworks (SWT/JFace and JavaFX) and a GUI visual builders.
- Object-Oriented paradigm is naturally applied in the abstraction of typical Aircraft Design problems.
- Promotes modularity: easier to work with in an ever changing team.

TIOBE Programming Community Index



JPAD typical work session

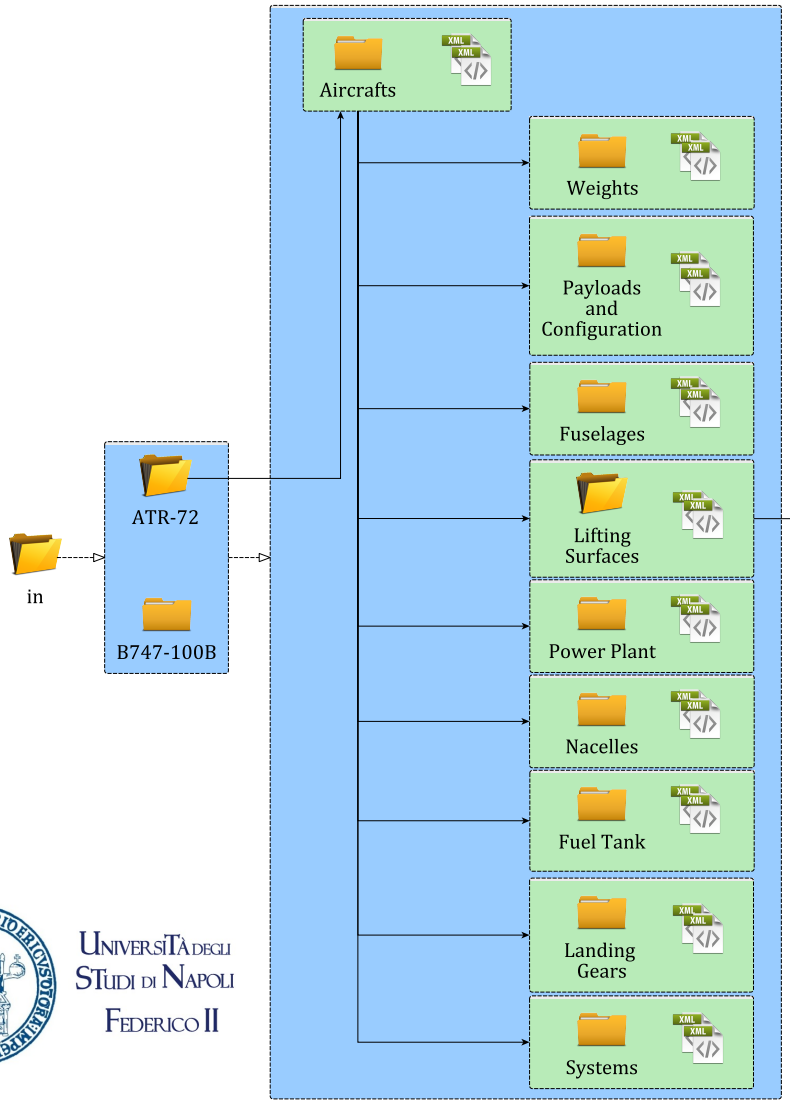


Input file

The input file type chosen is the XML (*eXtensible Markup Language*). It is a markup language that defines a set of rules for encoding documents in a format which is both *human-readable* and *machine-readable*; moreover its design goals of emphasize simplicity, generality and usability across the Internet.

- *Markup Language* due to the use of tags that describes the content.
- *extensible* because the markup symbols are unlimited and self-defining, so that it is possible to use a personal tag for each data.

Input file structure prototype

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