PRAGMA35 @Penang

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Web-based Compute-Data Research Environment for Aircraft Airfoil Aerodynamics

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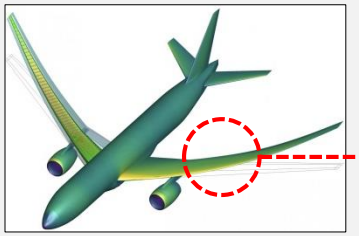
Korea Institute of Science and Technology Information (KISTI)

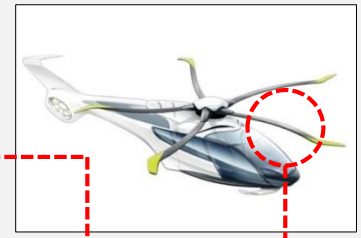
Contents

Importance of Airfoil Aerodynamics (1/2)

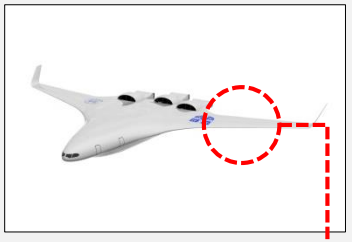
Flights



Airplane



Helicopter



UAV

Missile

Space vehicle

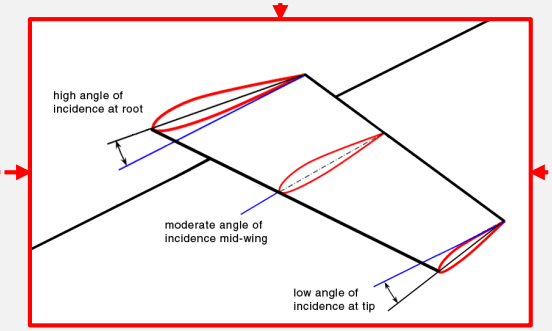
Wing

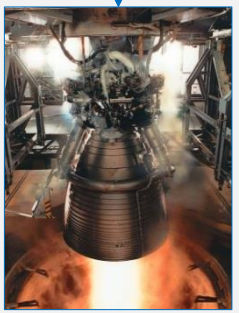
Blade

Body+Wing

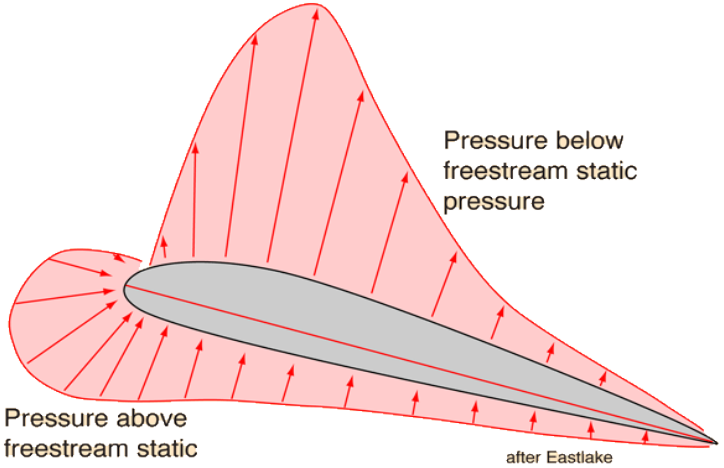
Lift Power Generator

Airfoil is the section of a wing or a blade which dominantly produce aerodynamic power

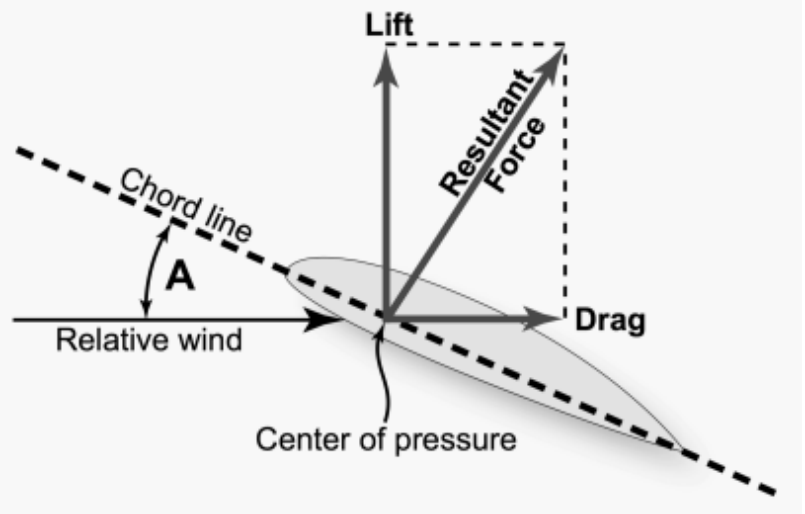




Engine

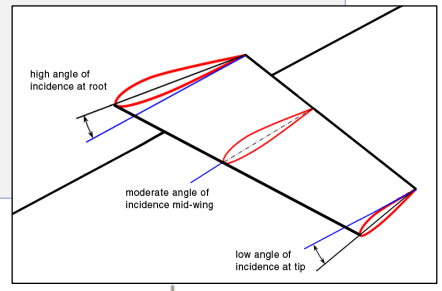


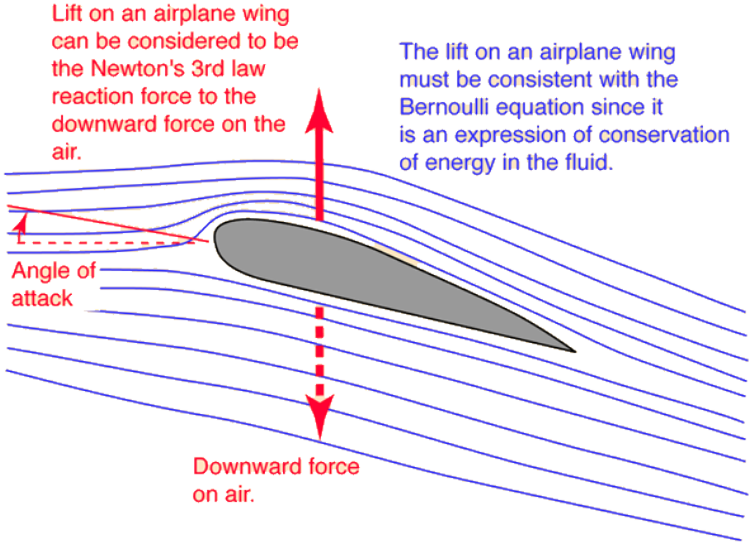
Pressure profile around airfoil

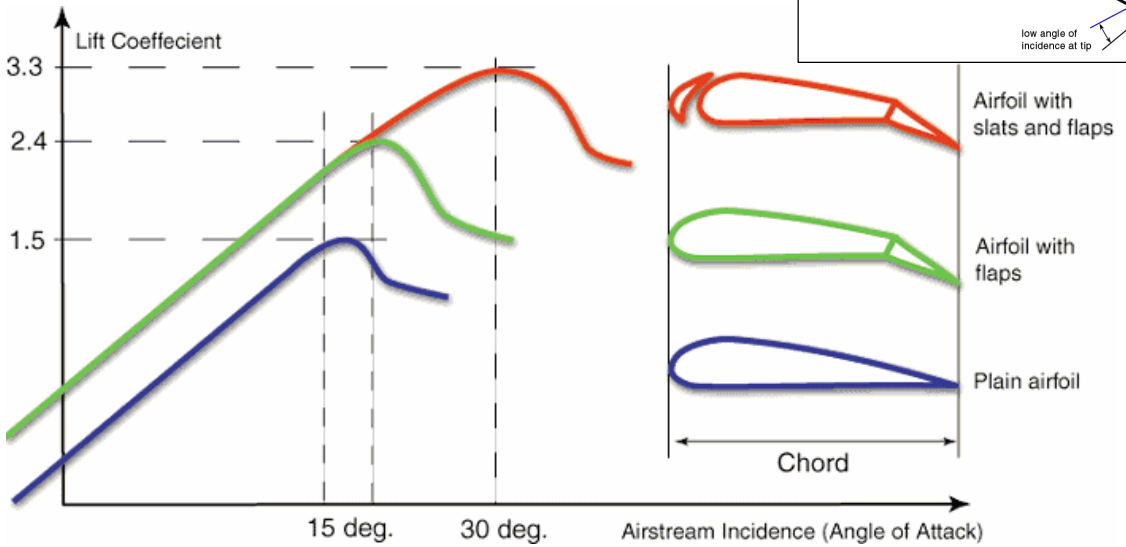


Importance of Airfoil Aerodynamics (2/2)

- ✓ Stream-lined shapes of airfoils cause aerodynamic performance such as lift force, drag force, moment, and etc.
- ✓ Because **even small deviations of the airfoil shape** make huge difference in the aerodynamic performances, airfoil shape must be determined for the given flight conditions
- ✓ Makes a **dominant effect on the aerodynamics** of wing and blade except for 3-dimensional effects (wing tip effect, cross flow effect)
- ✓ Used in the stage of preliminary wing design **quickly**
- ✓ Wind tunnel test for airfoils is much more difficult than wings





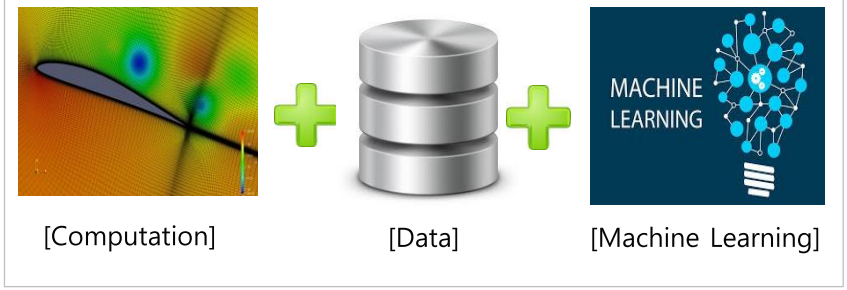


Contents

Developing Compute-Data Research Environment

Proof-of-Concept of Simulation-Data Expert System

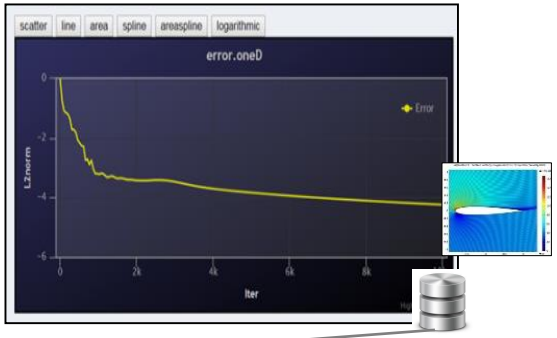
- based on UIUC Airfoil Database
- Airfoil/Wing Aerodynamics Research Environment



Research website for airfoil aerodynamics

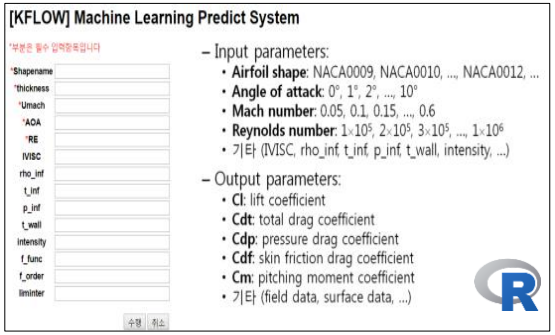
computation

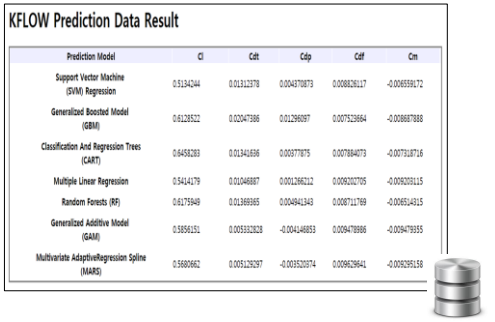
Physical modeling and simulation



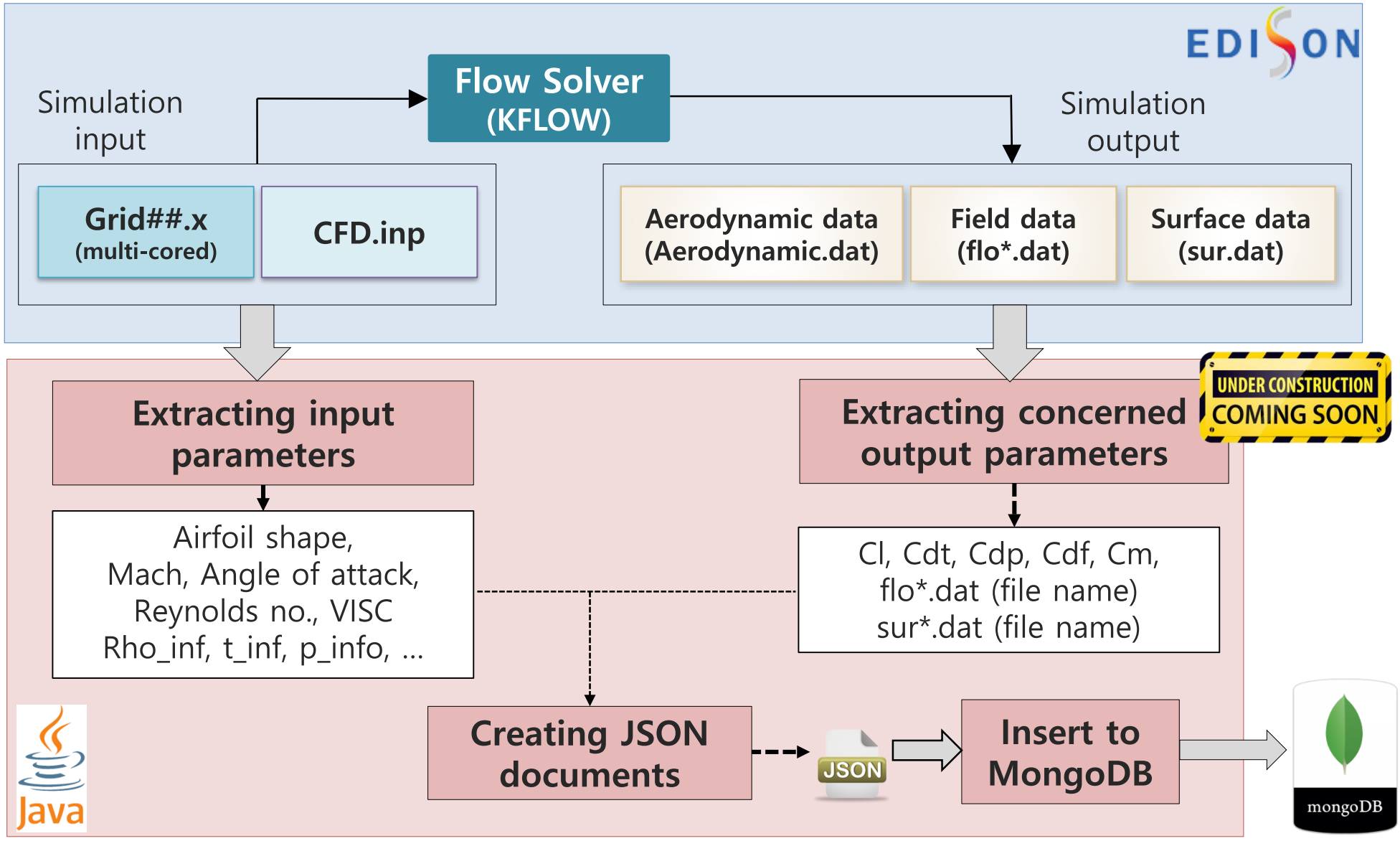
Data

Machine learning for quick performance prediction

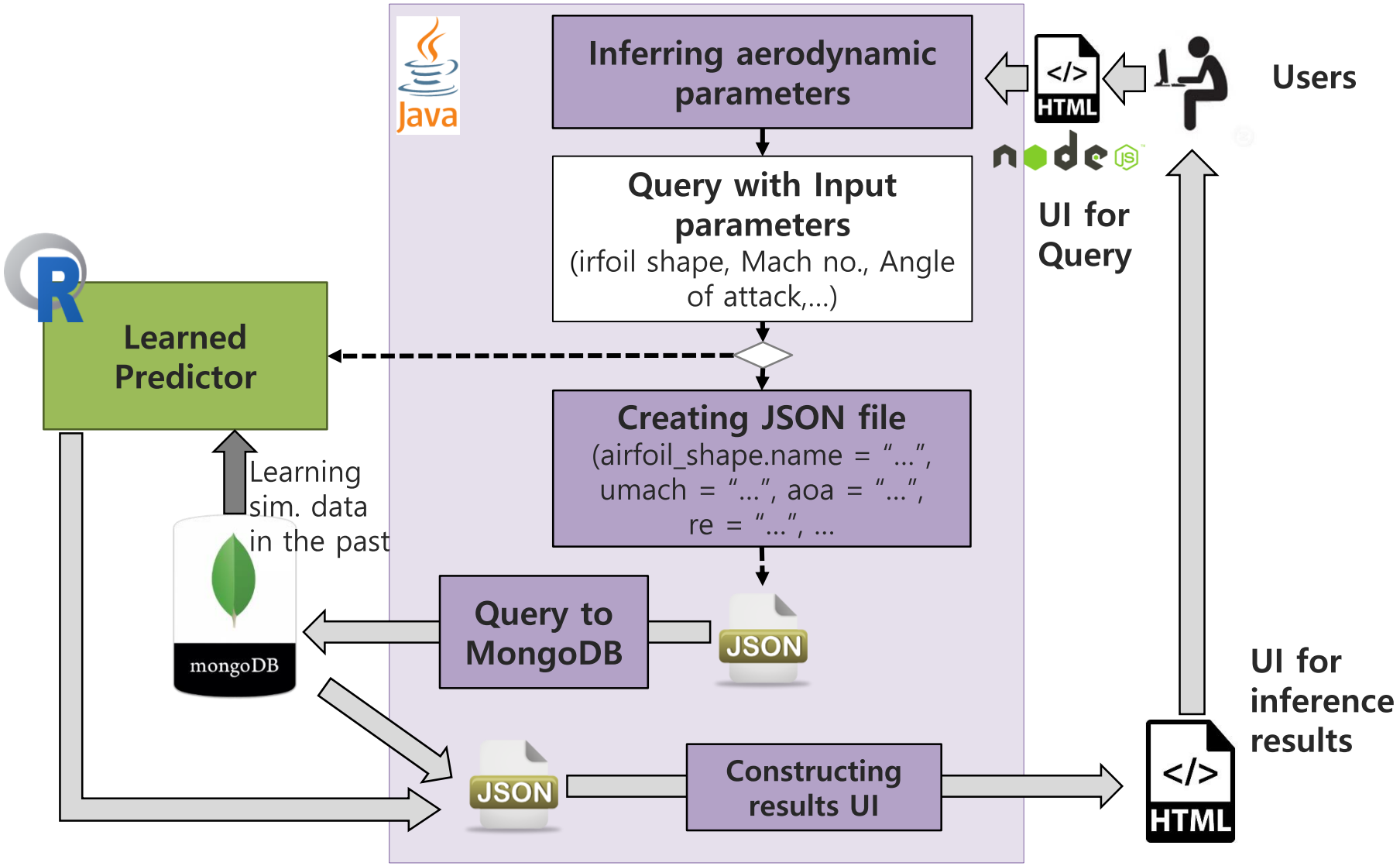




Architecture for Simulation Data Loader



Architecture for Simulation Data Query and Inference



Demo