

# Service based identification of physiological system in desktop grid

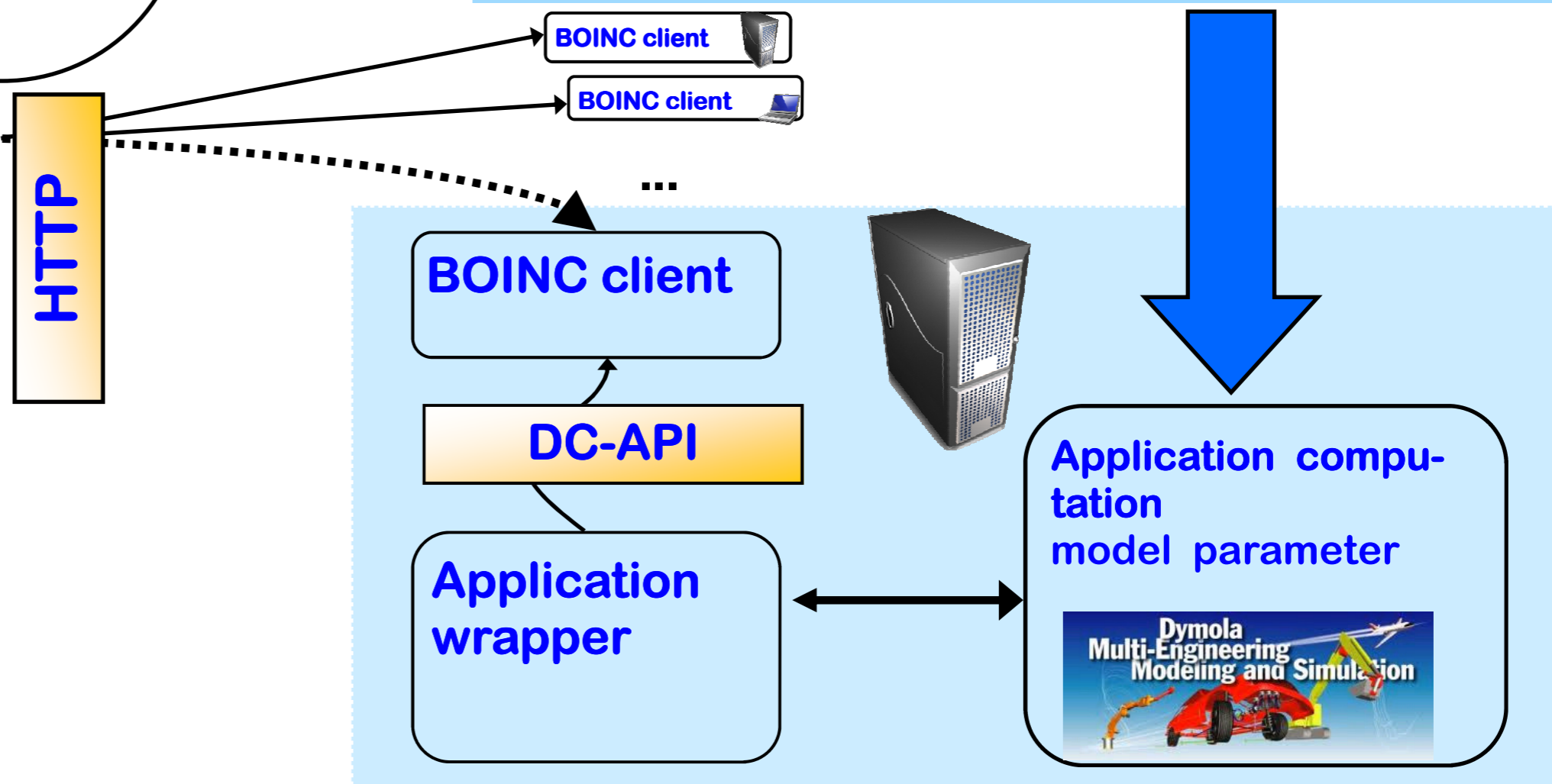
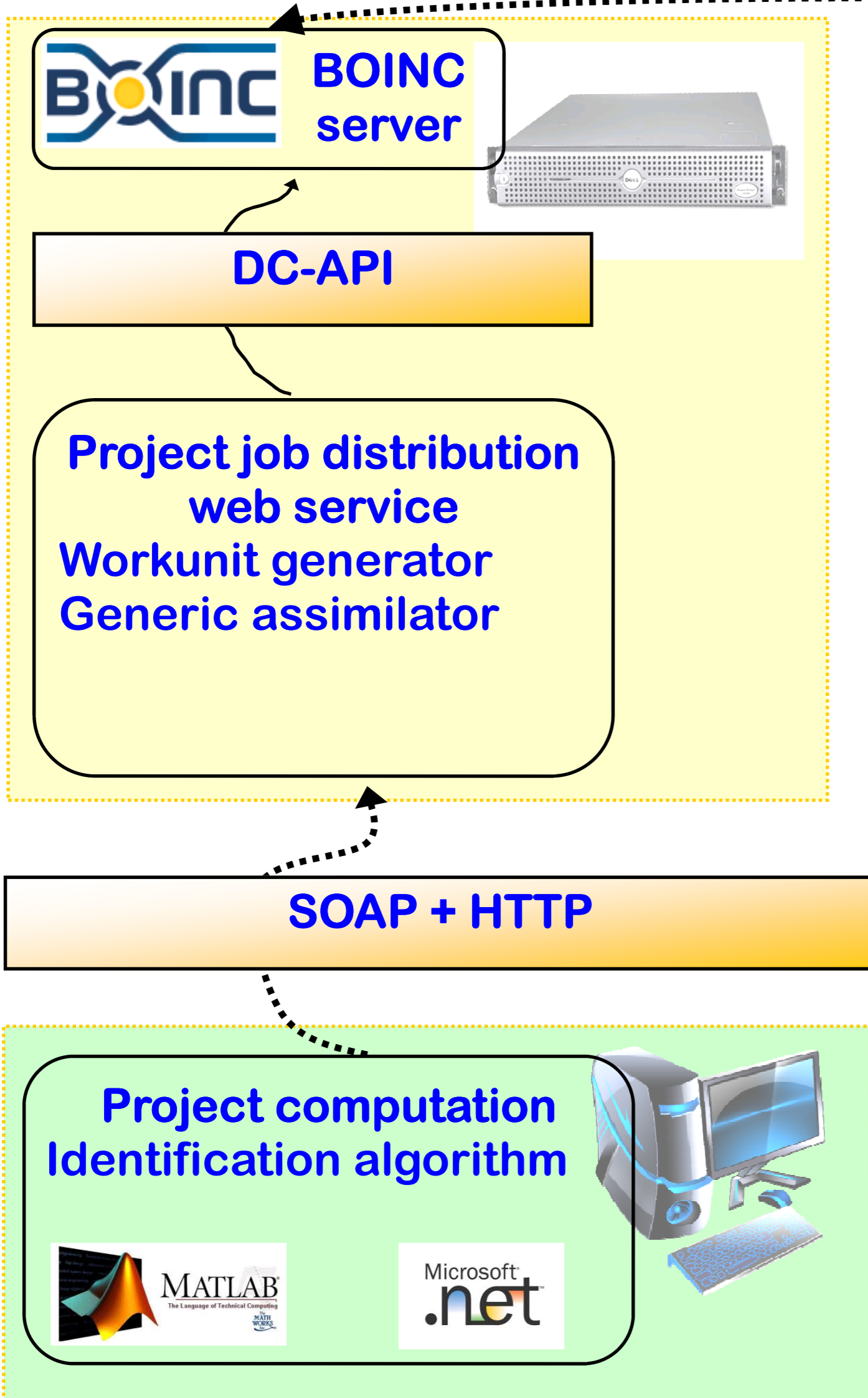
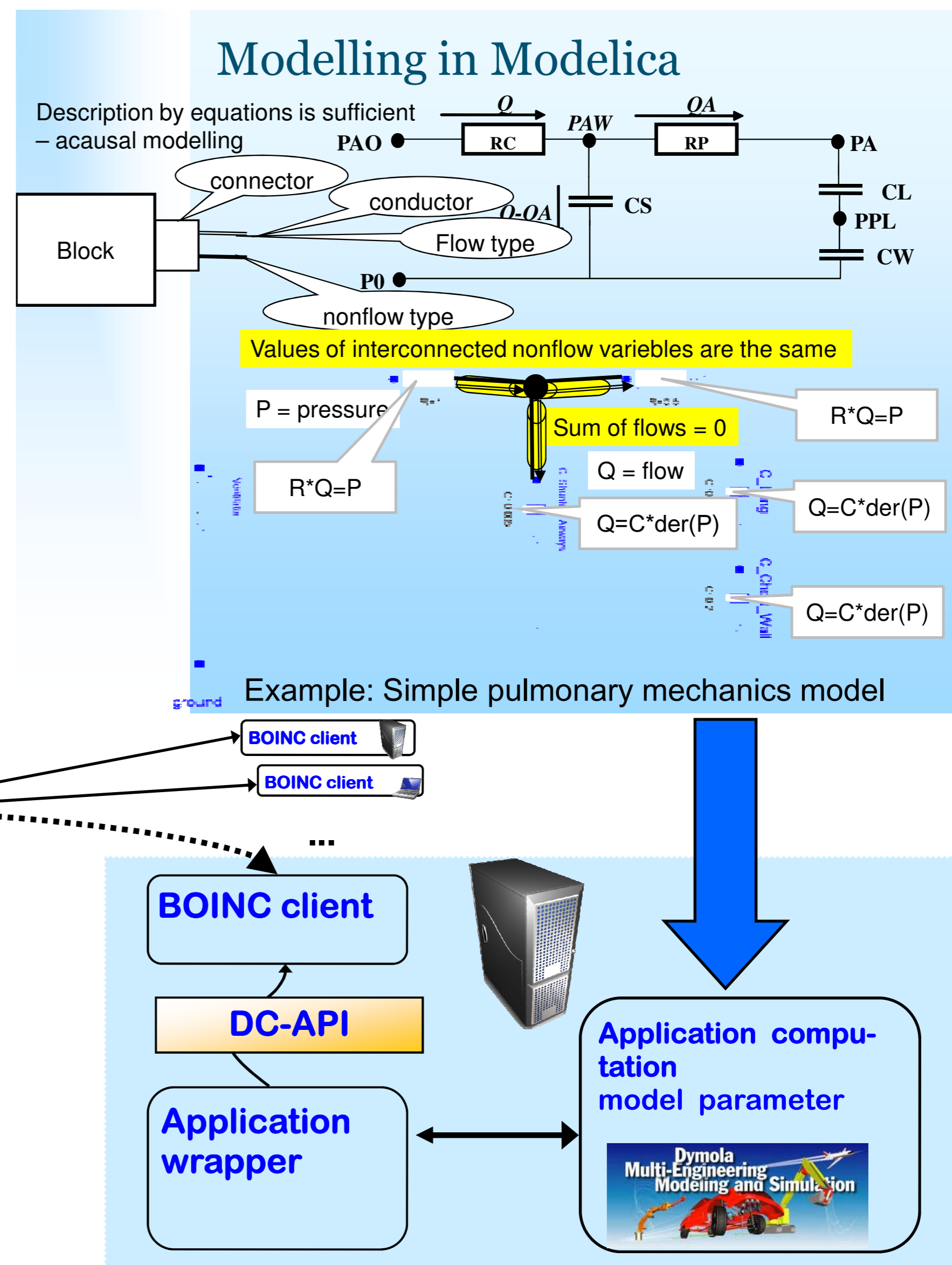
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The acausal modeling represents the modeled reality as a set of mathematical equations in contrast to causal modeling techniques which describes rather the algorithm to compute results from input.

The acausal modeling in Modelica[1] language gives an option to select which parameters are known and which are unknown and will be computed on the same model representation.

The goal of identification/validation is to determine model parameters so the model solution is as close as possible to the measured real data, this can be done by inversion or optimization methods. Identification algorithm is model independent. It's possible to validate physiological models and identify physiological system by comparing the computed/estimated parameters of the models of human physiology with real measurement on a patient.



Adapting identification to a desktop grid system BOINC[2] needs to link project computation (on the server) and application computation (on the client) with BOINC API. Some simplifications give DC-API[3]. To avoid tight coupling and linking between project and BOINC, the web service layer was introduced on the server side. On client side an application wrapper approach is sufficient. The project computation communicates via HTTP and SOAP protocol remotely with BOINC and

Identification algorithm using numerical optimization or inversion methods is implemented in MATLAB together with .NET assembly which sends parameter estimation tasks to the web service via SOAP. A model depended parameter estimation is currently compiled Modelica solver of Dymola tool. Other reliable tools are under development.

The introduced web service layer provides an access to capabilities of desktop grid system BOINC. However the integration level is loosely coupled which prevents vendor lock issue. Future change or enhancement of some parts would impact minimally the implementation of the other parts of the system. The future development is to enhance the system with more interactive part and with access to cloud computing capabilities. There is also considered replacement of the vendor for the Modelica language solver which is used for evaluation of model parameters.

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