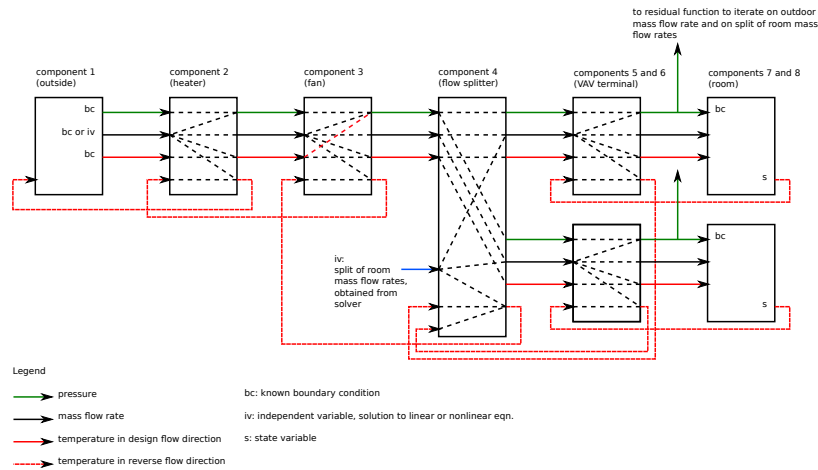


# Design choices for thermofluid flow components and systems that are exported as Functional Mockup Units

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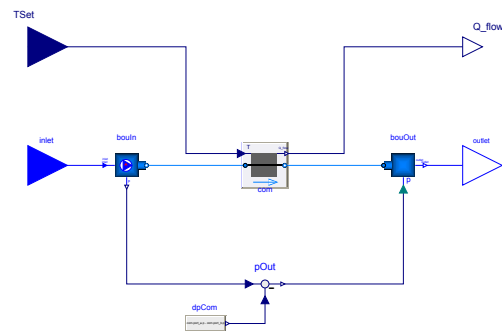


**Figure 1.** Direct input-output dependencies of FMUs connected in series that serve two rooms.

This paper discusses design decisions for exporting Modelica thermofluid flow components as Functional Mockup Units. It provides guidelines that will allow to effectively use FMUs for modeling of thermofluid flow components and systems. We provide an analysis for direct input-output dependencies of such components and systems, using directed graphs for different model formulations such as shown in Figure 1.

Based on this analysis, we provide recommendations that increase the computing efficiency of such components and systems that are formed by connecting multiple components. We explain what code optimizations are lost when providing thermofluid flow components as FMUs rather than Modelica code. We present an implementation of a package for FMU export of thermofluid flow components using replaceable models as shown in Figure 2.

We also explain the rationale for selecting the connector variables of the FMUs and provide computing benchmarks for different design choices.



**Figure 2.** Block that contains a replaceable model of a heater and that defines input and output signals for export as an FMU.