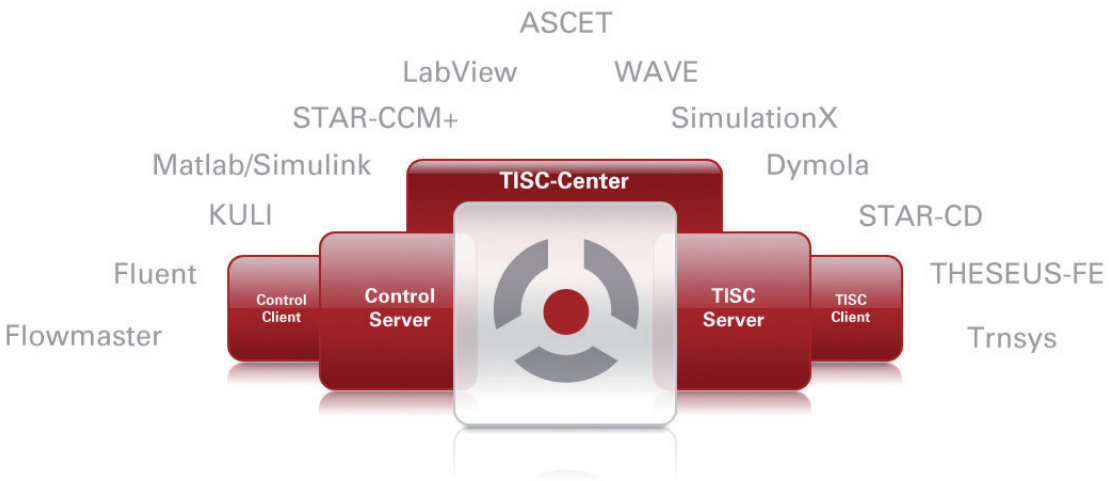
TISC®

TLK INTER SOFTWARE CONNECTOR

A product of TLK-Thermo GmbH



TISC connects simulation tools.

Product description

TISC is a co-simulation environment for controlling different simulation applications and exchanging data between them. TISC organizes the co-simulation setup by managing simulation programs, models, parameters and initialization settings, different simulation computers as well as IP connections.

During a co-simulation, TISC exchanges the data between the simulation programs, synchronizes, handles events and graphically reports the exchanged data.

The interfaces are integrated into the simulation programs using C, C++, C# (using .NET Framework 2.0), Python or FORTRAN. The program is also controlled through COM. By utilizing the Qt library by Trolltech and other platform independent libraries, TISC can be used on different operating systems such as Windows, Linux or HP-UX.

TISC has existing interfaces for ASCET, Flowmaster, Fluent, KULI, LabVIEW, Matlab/Simulink, Dymola, SimulationX, STAR-CCM+, STAR-CD, THESEUS-FE, Trnsys and WAVE. Additional clients are underway and can be developed upon request.

Interfaces to in-house software tools can be developed by TLK, or a developer kit for implementing custom interfaces is also available. It is useful to introduce TISC in your company in two steps. In the first step, the TISC simulation layer should be introduced. When the co-simulation is working fine, the TISC control layer can be used in the second step to control and manage the simulation programs.

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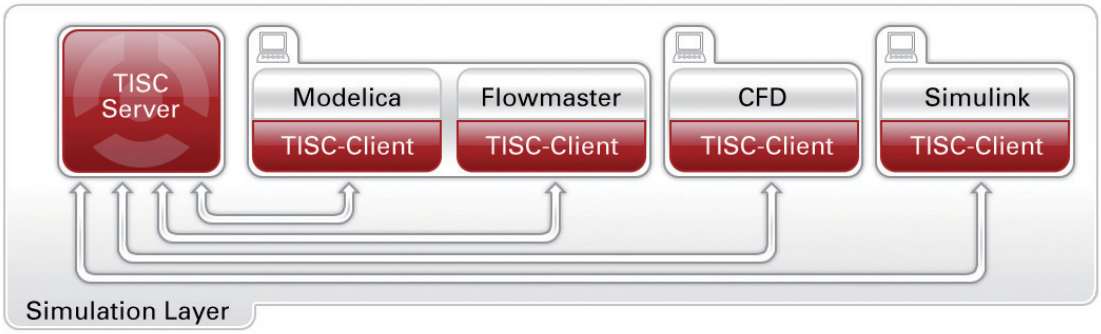

Simulation layer

The simulation layer of TISC consists of the TISC-Server and the TISC-Clients. The simulation layer exchanges data between the different simulation programs. The data sent can consist of scalars, vectors or matrices which are uniquely identified by their name and type. Real and integer values can be transferred as well as strings. A TISC-Client is integrated into each simulation program. This client sends data to, and receives data from a TISC-Server through the network using TCP/IP sockets. The TISC-Server synchronizes and distributes the data among the clients at every time step. The clients can be configured to be ready for the synchronization in three different ways:

- The client is always prepared to be synchronized.
- The client is prepared when it has sent all data.
- The client is prepared when it has sent a special signal to the server.

The API of the TISC clients is kept simple in order to help integrating it into the different simulation tools.

The simulation layer can be licensed and used without the control layer. You only need the TISC-Server and the TISC-Clients for your simulation programs.

Code example

Defining a connection which sends a double precision variable “x” and receives an integer “y” from the TISC-Server respectively.

```
ClientSideConnection *tisc = new ClientSideConnection();
tisc->setDescription("TestConnection");
int xId = tisc->clientSendContainer()->addVariable("x", "Double");
int yId = tisc->clientReceiveContainer()->addVariable("y", "Integer");
tisc->connectToServer("127.0.0.1", 2000);
for (int i = 1; i <= nTimeSteps; ++i) {
    tisc->clientSendContainer()->storeDouble(xId, xValue);
    tisc->waitForSyncSignal();
    tisc->clientReceiveContainer()->getInteger(yId, yValue);
    <WORK>    //Carry out calculations
}
```

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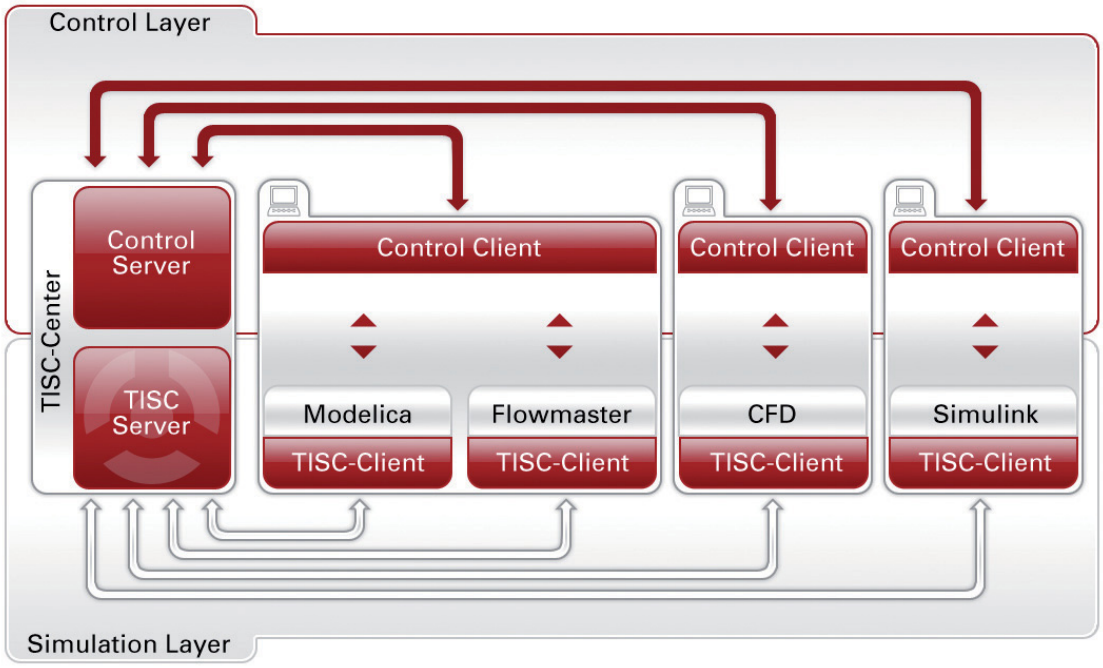


Control layer

The control layer of TISC consists of the control clients and the control server, connected by the TISC-Center. On each computer involved in a co-simulation, one control client is installed. It acts as a distributed information and control manager accessed by the TISC-Center and has the following purposes:

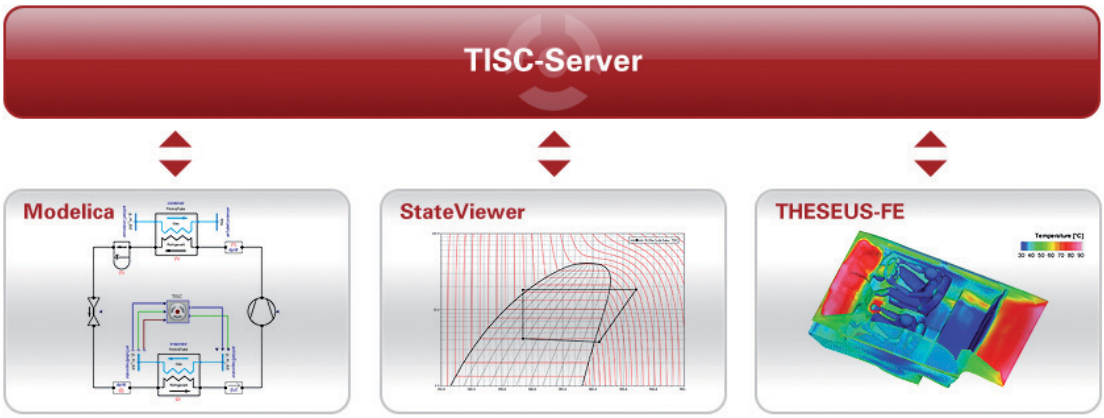
- List all simulation programs installed on the computer
- List all models of the simulation programs
- Set parameters and initial values for the models
- Start, control and stop the simulation programs
- Communicate with the TISC-Center concerning the available information as well as set up and control a co-simulation

The control client is able to extract the model parameters and initialization values from the models of most of the simulation programs. The TISC-Center is the central human-machine interface for the simulation engineer. It is able to connect to the distributed control clients to retrieve information and send commands. The tasks of the TISC-Center are:

- Central management of a co-simulation setup including parameter and initialization settings
- Central control of the co-simulation process
- Central data management of the simulation results including visualization

The TISC-Center allows for a convenient model exchange. The integration of the scripting language Python is on the way. It will provide a convenient script-based control of the co-simulation process including parameter variations.

Sample of using the simulation layer



Product list

Art.-No. T-00010 / Starter kit: TISC-Server, TISC-Information Monitor and TISC-Filesource
Art.-No. T-01010: TISC-Interface to Flowmaster
Art.-No. T-01020: TISC-Interface to Fluent
Art.-No. T-01030: TISC-Interface to KULI
Art.-No. T-01040: TISC-Interface to LabVIEW
Art.-No. T-01050: TISC-Interface to Matlab/Simulink
Art.-No. T-01060: TISC-Interface to Modelica with Dymola integration
Art.-No. T-01061: TISC-Interface to Modelica with SimulationX integration
Art.-No. T-01070: TISC-Interface to STAR-CD
Art.-No. T-01071: TISC-Interface to STAR-CCM+
Art.-No. T-01080: TISC-Interface to THESEUS-FE
Art.-No. T-01090: TISC-Interface to Trnsys
Art.-No. T-01100: TISC-Interface to WAVE
Art.-No. T-01110: TISC-Interface to ASCET
Art.-No. T-02010: TISC-Center with Control-Clients
Art.-No. T-03010: StateViewer with TISC-Client

Reference list (partial)

AUDI AG, BMW AG, Daimler AG, RWTH Aachen, P+Z Engineering, TU Berlin, TU Braunschweig, TU Hamburg-Harburg, VOLKSWAGEN AG

Contact

For further information please contact:

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