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An object oriented component library for generic modular modelling of dynamic systems

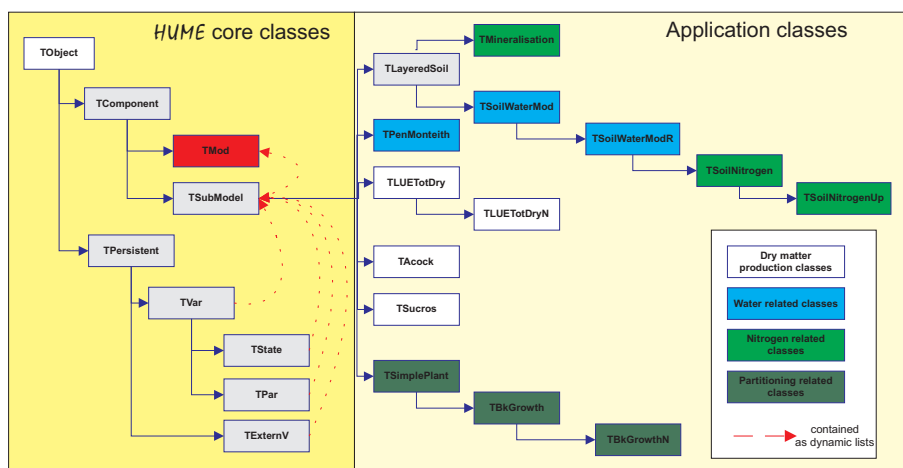
Objectives

The task of numerical modelling of agricultural systems calls for appropriate methods and tools of software technology. Modularity and generessity as supported by modern object oriented software design may help to overcome the problems of complexity which arise when constructing, maintaining and reusing models of agricultural systems.

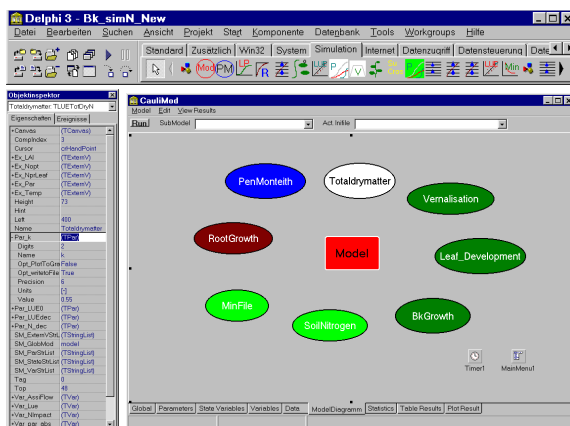
Results

The HUME modelling environment is an object oriented class library based upon the Delphi™ /C++ Builder™ software development technology. Any model based on the HUME library consists of one main-model module and a number of sub-models. All sub-models have to be derived from the base class TSubModel which contains dynamic lists of state variables (Tstate), auxilliary variables (TVar), parameters (TPar) and 'external values' (TExternV), i.e. values needed from outside the sub-model. In every model an instance of Tmod is responsible for the control of the simulation and implements methods like calculating basic statistics and parameter estimation. The Tmod and TSubmodel classes are derived from the TComponent class of Borlands™ Visual Component Library. They are therefore accessible by drag and drop from a tool bar and can easily be manipulated at 'design time' by means of a generic 'object inspector' or by specially designed component editors.

Class hierarchy

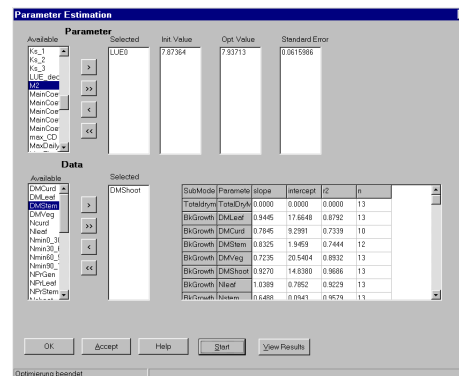


Environment at 'design time'



A graphical user interface for scientific purposes has been constructed which allows efficient control of model in- and output in tables and plots.

Parameter estimation dialog at 'run time'



Conclusions and Outlook

The HUME component library, based on the state variable approach, is very flexible and computationally efficient. It is still under construction and not yet documented, but it seems to be already a useful tool for modelling agricultural systems. Further developments including a GIS interface and enhanced parameter estimations methods are planned.

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