Motivation
Typical use cases
Statistics and outlook

Virtual lAboratory for Earth system STudies
Overview

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studying the Earth system

strategy 1 analyse PBytes of model output
$\rightarrow$ CMIP3..5..6..

strategy 2 use the models to find answers
$\rightarrow$ model sensitivity studies

Which strategy helps more to understand the Earth system processes?

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playing with the models

- the compilation, installation and application of Earth system models is a nightmare
- Earth system scientists not highly motivated to develop software
- understanding the uncertainties e.g. of parameter variations can be forced by using the models

What software is needed?

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Key features

gateway to HPC more complexity needs more computer ressources, access restricted

webbased interface OS independend experiment configuration

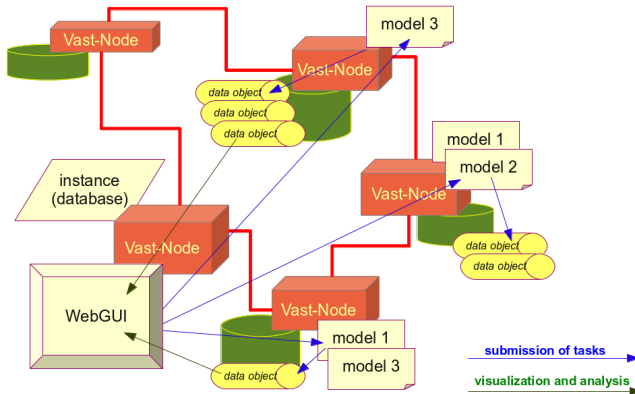**unified interface to different models** python based library and tools

$\rightarrow$ runscript.py

init initialize experiment environment

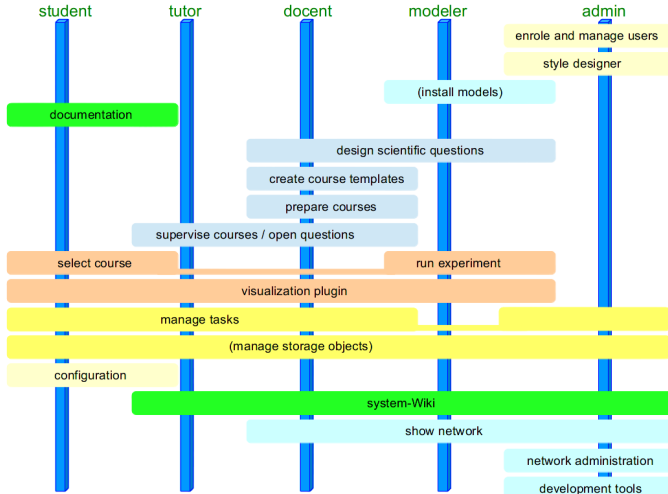**batch** create batch file

submit start/continue experiment chain

E-Learning functionality guidance needed for using models and doing experiments

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VAST design

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Role-Workflow-Matrix ... an example

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Practice

Demo 1 prepare and supervise a course

Demo 2 perform an experiment

https://vast.klimod.de/

... follow the link to the portal and find different vast instances including the production system

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Practice

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demo 1 - course supervision

preparatory work (dozent)

- take a model, compose a scientific question and define all visible/changeable control parameters
- take questions and compose a course template
- use a course template, create a course, enrole students
- open/close experiments for students

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demo 2 - perform an experiment

(a) course selection (student) (b) direct start (modeler)

- select an available scientific question
- reasonable configuration of control parameters
- submit the experiment
- inspect the runtime informations
- analyse the results (calculate climatologies, visualize data, CMORize data, ...)

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VAST roadmap

https://vast.klimod.de/

- available models ...
  EBM, PUMA, PLASIM, CCLM, ECHAM5

- testing phase ...
  COSMOS1, CLIMBER2, ICON, MPIESM1

- implemented workflows ...
  model configuration and execution, course configuration and
  supervision, administration, registration, analysis workflow,
  integration of plugins (analysis tool, plot engine, ...), system testing

- work in progress ...
  workspace manager, improvement of workflows

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VAST courses

2012-2015 Development phase, since Oct/2015 in production

GeoX September/October 2015, 3 days, 8 students, experiments with PLASIM

GeoSim October 2015, 2 days, 18 students, case study Katrina with CCLM

WS15/16 Meteorology 12 students, EBM, PUMA, ensemble simulations with ECHAM5

WS15/16 EES 5 students, EBM, PLASIM, 20 year sensitivity studies

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VAST outlook

- improvement of the GUI performance
- testing and installation of computation-node-part on ZEDAT-soroban and DKRZ-mistral
- implementation of the workspace-manager (cloud-tools ?)
- development of E-Learning moduls "from model ensemble to validation and diagnostics", combination of VAST with FrEva
  $\rightarrow$ **FreVast**

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Conclusions

Learn from yesterday, live for today,
hope for tomorrow.
The important thing is not to stop questioning.

Albert Einstein

A life spent making mistakes is not only more honorable,
but more useful than a life spent doing nothing.

George Bernard Shaw