SHOP news

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User Meeting – 17.11.2021

REST SHOP

- Implemented in FastAPI web framework (python)

REST SHOP 14.0.0a OAS3

/openapi.json

SINTEF Energy

Authentication Not required during development - Used to authenticate user.

POST /token Login For Access Token

Session All model objects and operations are tied to a Session

GET /session Get Session

POST /session Create Session

GET /sessions Get Sessions

Time Resolution Specify the time resolution for the optimization problem

GET /time_resolution Get Time Resolution

PUT /time_resolution Set Time Resolution

Model The model of a given Session. Use this endpoint to create, read, update, destroy model objects

GET /model Get Model Object Types

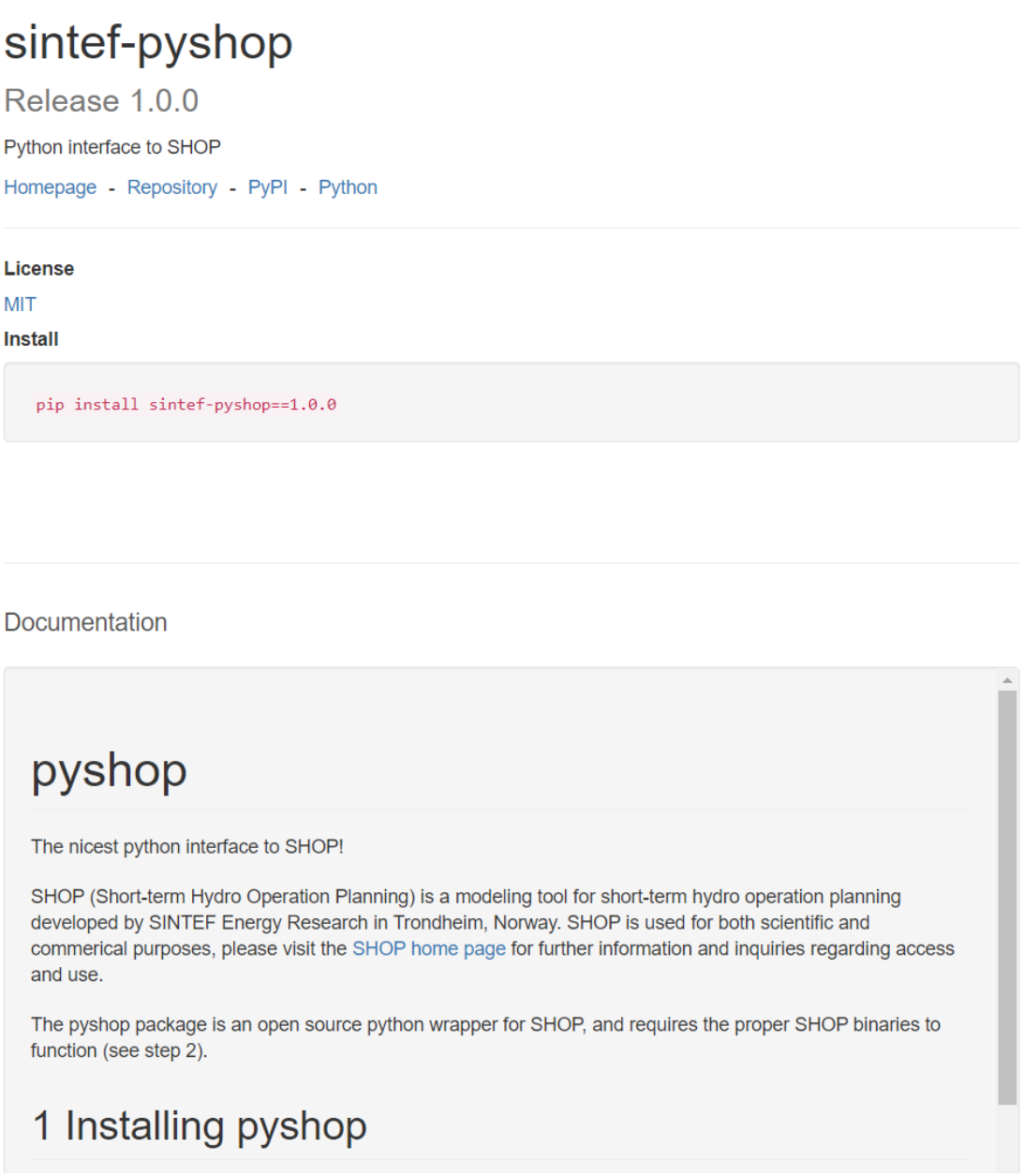
GET /model/{object_type}/information Get Model Object Type Information

GET /model/{object_type} Get Model Object Instance

PUT /model/{object_type} Create Or Modify Existing Model Object Instance

SHOP on PyPI

- Use "pip install sintef-pyshop"
- Download SHOP core from SHOP portal
- Windows
  - cplex2010.dll
  - shop_cplex_interface.dll
  - shop_pybind.pyd
- Linux
  - shop_cplex_interface.so
  - shop_pybind.so



sintef-pyshop

Release 1.0.0

Python interface to SHOP

Homepage - Repository - PyPI - Python

License

MIT

Install

```
pip install sintef-pyshop==1.0.0
```

Documentation

pyshop

The nicest python interface to SHOP!

SHOP (Short-term Hydro Operation Planning) is a modeling tool for short-term hydro operation planning developed by SINTEF Energy Research in Trondheim, Norway. SHOP is used for both scientific and commerical purposes, please visit the SHOP home page for further information and inquiries regarding access and use.

The pyshop package is an open source python wrapper for SHOP, and requires the proper SHOP binaries to function (see step 2).

1 Installing pyshop

SHOP LP API

- Very useful for students
- Test new modelling concepts before adding them to the SHOP core
- Example from pyshop, but available in Julia as well

```
[15]: shop.lp_model.var[0].info()
```

```
[15]: {'id': 0,
 'type_id': 0,
 'type_name': 'Reservoir storage',
 'index_type_ids': array([ 1, 35,  2]),
 'index_type_names': array(['time step', 'Scenario', 'reservoir'], dtype='<U17'),
 'index_values': array([0, 0, 0]),
 'index_descriptions': ['0 (27/2 00:00)', '0', '0 (Reservoir1)'],
 'ub': 12.0,
 'lb': 0.0,
 'cc': 0.0,
 'bin': 0}
```

```
[16]: #shop.lp_model.var[var_id].set_parameters(ub=, lb=, cc=, bin=)
shop.lp_model.var[0].set_parameters(ub=9.0)
```

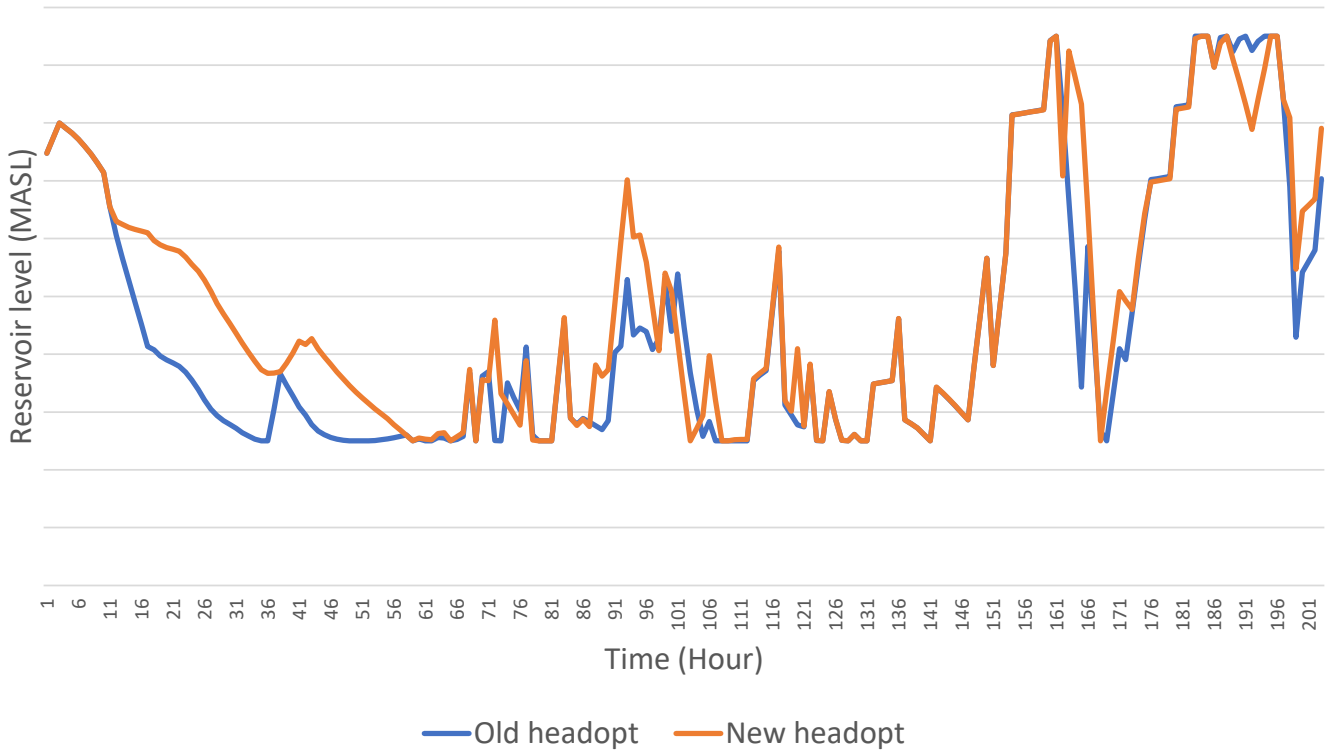
```
[16]: 0
```

```
[17]: shop.lp_model.load_model() # We must call load refresh the values in python memory
shop.lp_model.var[0].info()
```

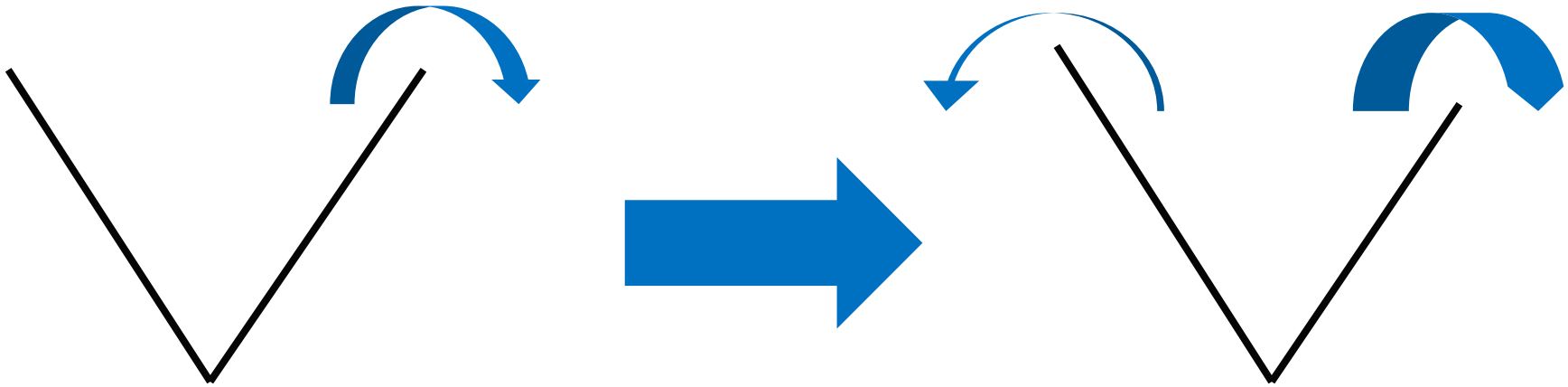
```
[17]: {'id': 0,
 'type_id': 0,
 'type_name': 'Reservoir storage',
 'index_type_ids': array([ 1, 35,  2]),
 'index_type_names': array(['time step', 'Scenario', 'reservoir'], dtype='<U17'),
 'index_values': array([0, 0, 0]),
 'index_descriptions': ['0 (27/2 00:00)', '0', '0 (Reservoir1)'],
 'ub': 9.0,
 'lb': 0.0,
 'cc': 0.0,
 'bin': 0}
```

Improved head optimization (14.0.2.0 +)

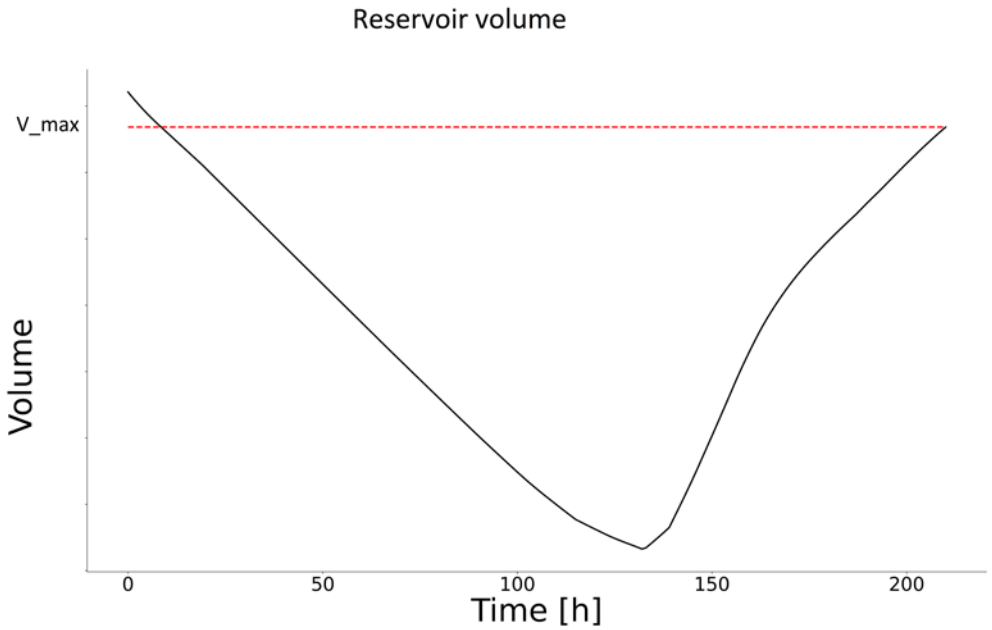
- Added indirect effects on change in efficiency of up- and downstream generators for all reservoirs



Decouple spill calculation from reservoir flow description



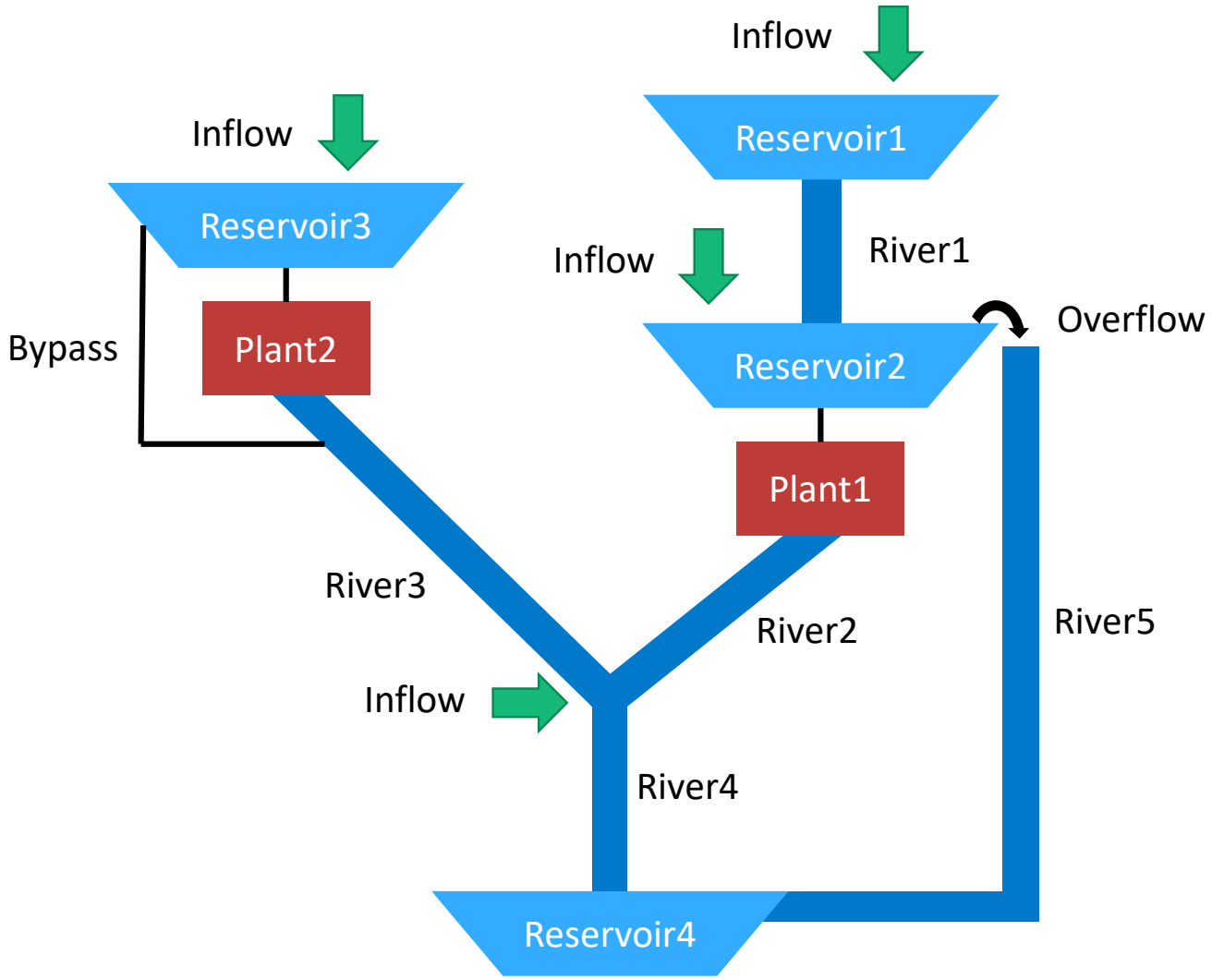
Flood support



- Goal: Better handling of flood situations in SHOP
- Going over the maximal reservoir volume
- Cost curves for volume and flow over a certain limit
- Under development, coordination with the river module project

River module

- Possible to model geometry of individual river sections
- Environmental restrictions can be mapped to accurate location
- Time delay can be modelled separately for each river section
- State of flow in river is taken into account by a new dynamic time delay function
- Harmonized valuation of delayed water
- More accurate representation of tailrace loss



Ancillary service extensions

- FCR-D down
  - Ready at the end of this year
- Ancillary service costs (wear and tear)
  - Possibility of adding an extra cost coefficient per reserve type
- Extended ancillary service limits
  - Restrict the total capacity of the spinning reserves allowed on unit and/or plant

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