



BPL_TEST2_Fedbatch script with FMPy...

The key library PyFMI ver 2.9.8 is installed.

After the installation a small application BPL_CHO_Fedbatch is loaded and run. You can continue with this example if you like.

```
In [ ]: !lsb_release -a # Actual VM Ubuntu version used by Google
```

```
No LSB modules are available.  
Distributor ID: Ubuntu  
Description:    Ubuntu 20.04.5 LTS  
Release:        20.04  
Codename:       focal
```

```
In [ ]: %env PYTHONPATH=
```

```
env: PYTHONPATH=
```

```
In [ ]: !wget https://repo.anaconda.com/miniconda/Miniconda3-py38_22.11.1-1-Linux-  
!chmod +x Miniconda3-py38_22.11.1-1-Linux-x86_64.sh  
!bash ./Miniconda3-py38_22.11.1-1-Linux-x86_64.sh -b -f -p /usr/local  
import sys  
sys.path.append('/usr/local/lib/python3.8/site-packages/')
```

```
--2023-01-21 09:07:33-- https://repo.anaconda.com/miniconda/Miniconda3-  
py38_22.11.1-1-Linux-x86_64.sh  
Resolving repo.anaconda.com (repo.anaconda.com)... 104.16.131.3, 104.16.  
130.3, 2606:4700::6810:8203, ...  
Connecting to repo.anaconda.com (repo.anaconda.com)|104.16.131.3|:443...  
connected.  
HTTP request sent, awaiting response... 200 OK  
Length: 64630241 (62M) [application/x-sh]  
Saving to: 'Miniconda3-py38_22.11.1-1-Linux-x86_64.sh'
```

```
Miniconda3-py38_22. 100%[=====>] 61.64M 138MB/s in  
0.4s
```

```
2023-01-21 09:07:33 (138 MB/s) - 'Miniconda3-py38_22.11.1-1-Linux-x86_6  
4.sh' saved [64630241/64630241]
```

```
PREFIX=/usr/local  
Unpacking payload ...
```

```
Installing base environment...
```

```
Downloading and Extracting Packages
```

```
Downloading and Extracting Packages
```

```
Preparing transaction: - done  
Executing transaction: | / - \ done  
installation finished.
```

```
In [ ]: !conda update -n base -c defaults conda --yes
```

```
Collecting package metadata (current_repodata.json): - \ | / -
\ | / done
Solving environment: \ | / - \ | / - \ | / - \
| / - \ |
The environment is inconsistent, please check the package plan carefully
The following packages are causing the inconsistency:
```

- conda-forge/linux-64::tbb==2021.7.0=h924138e_1
- conda-forge/linux-64::numpy==1.24.1=py38hab0fcb9_0
- conda-forge/linux-64::suitesparse==5.10.1=h9e50725_1
- conda-forge/linux-64::scipy==1.10.0=py38h10c12cc_0
- conda-forge/linux-64::libcbblas==3.9.0=16_linux64_openblas
- conda-forge/linux-64::libopenblas==0.3.21=threads_h78a6416_3
- conda-forge/linux-64::pyfmi==2.9.8=py38h26c90d9_1
- conda-forge/linux-64::assimulo==3.3=py38h71f17ff_1
- conda-forge/linux-64::libblas==3.9.0=16_linux64_openblas
- conda-forge/linux-64::liblapack==3.9.0=16_linux64_openblas
- conda-forge/linux-64::libhwloc==2.8.0=h32351e8_1
- conda-forge/linux-64::fmilib==2.4.1=h27087fc_0
- conda-forge/linux-64::sundials==6.4.1=h89a52a3_0

```
/ - \ | / - \ | / - \ | / - \ | failed
with repodata from current_repodata.json, will retry with next repodata
source.
```

```
Solving environment: - \ | / - \ | / - \ | / -
\ | / - \ | / - \ | / - \ | / - failed
with repodata from current_repodata.json, will retry with next repodata
source.
```

```
Collecting package metadata (repodata.json): | / - \ | / -
\ | / - \ | / - \ | / - \ | / - \ |
/ - \ | / - \ | / - \ | / - \ | / -
\ | / - \ | / - \ | / - \ | / -
\ | done
```

```
Solving environment: - \ | / - \ | / - \ | / -
\ | / - \ | / - \ | / - \ | / - \ |
/ - \ | / - \ | / - \ | / - \ | / -
\ | / - \ | / - \ | / - \ | / - \ |
/ - \ | / - \ | / - \ | / - \ |
```

```
The environment is inconsistent, please check the package plan carefully
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```

- conda-forge/linux-64::tbb==2021.7.0=h924138e_1
- conda-forge/linux-64::numpy==1.24.1=py38hab0fcb9_0
- conda-forge/linux-64::suitesparse==5.10.1=h9e50725_1
- conda-forge/linux-64::scipy==1.10.0=py38h10c12cc_0
- conda-forge/linux-64::libcbblas==3.9.0=16_linux64_openblas
- conda-forge/linux-64::libopenblas==0.3.21=threads_h78a6416_3
- conda-forge/linux-64::pyfmi==2.9.8=py38h26c90d9_1
- conda-forge/linux-64::assimulo==3.3=py38h71f17ff_1
- conda-forge/linux-64::libblas==3.9.0=16_linux64_openblas
- conda-forge/linux-64::liblapack==3.9.0=16_linux64_openblas
- conda-forge/linux-64::libhwloc==2.8.0=h32351e8_1
- conda-forge/linux-64::fmilib==2.4.1=h27087fc_0
- conda-forge/linux-64::sundials==6.4.1=h89a52a3_0

```
/ - \ | / - \ | / - \ | / - \ | / -
\ | / - \ | / - \ | / - \ | / - \ |
/ - \ | / - \ | / - \ | / - \ | / -
\ | / - \ | / - \ | / - \ | / - \ |
```

```

/ - \ | / - \ | / - \ | / - \ | / -
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Solving environment: - \ | / - \ | / - \ | / - \ | / -
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/ - \ | / - \ | / - \ | / - \ | / -
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/ - \ | / - \ | / - \ | / - \ | / -

```

Found conflicts! Looking for incompatible packages.
This can take several minutes. Press CTRL-C to abort.
/ failed

UnsatisfiableError: The following specifications were found
to be incompatible with the existing python installation in your environ-
ment:

Specifications:

```

- conda-content-trust -> python[version='>=2.7,<2.8.0a0|>=3.6,<3.7.0a0
|>=3.5,<3.6.0a0']
- wheel -> python[version='>=3.10,<3.11.0a0|>=3.9,<3.10.0a0|>=3.11,<3.
12.0a0']

```

Your python: python=3.8

If python is on the left-most side of the chain, that's the version yo
u've asked for.
When python appears to the right, that indicates that the thing on the l
eft is somehow
not available for the python version you are constrained to. Note that c
onda will not
change your python version to a different minor version unless you expli
citly specify
that.

The following specifications were found to be incompatible with a past
explicit spec that is not an explicit spec in this operation (setuptools):

```

- conda -> conda[version='>=22.11.1']
- conda -> python[version='>=3.9,<3.10.0a0'] -> pip
- conda -> ruamel.yaml[version='>=0.11.14,<0.18'] -> setuptools
- conda -> setuptools[version='>=31.0.1']

```

The following specifications were found to be incompatible with each oth
er:

Output in format: Requested package -> Available versions

Package libgcc-ng conflicts for:

```

setuptools -> python[version='>=3.10,<3.11.0a0'] -> libgcc-ng[version='>=11.2.0|>=7.5.0|>=7.3.0|>=7.2.0']
libopenblas -> libgcc-ng[version='>=11.2.0|>=7.5.0|>=7.3.0|>=8.2.0|>=7.2.0|>=12']
conda-content-trust -> cryptography -> libgcc-ng[version='>=11.2.0|>=7.2.0|>=7.3.0|>=7.5.0']
assimulo -> libgcc-ng[version='>=12']
certifi -> python[version='>=3.9,<3.10.0a0'] -> libgcc-ng[version='>=11.2.0|>=7.5.0|>=7.3.0|>=7.2.0']
wheel -> python -> libgcc-ng[version='>=11.2.0|>=7.5.0|>=7.3.0|>=7.2.0']
openssl -> libgcc-ng[version='>=11.2.0|>=7.5.0|>=7.3.0|>=7.2.0']
libblas -> libopenblas[version='>=0.3.21,<0.3.22.0a0'] -> libgcc-ng[version='>=11.2.0|>=12']
sundials -> libgcc-ng[version='>=12']
numpy -> libopenblas[version='>=0.3.2,<0.3.3.0a0'] -> libgcc-ng[version='>=8.2.0']
suitesparse -> tbb[version='>=2020.3'] -> libgcc-ng[version='>=12']
assimulo -> numpy[version='>=1.20.3,<2.0a0'] -> libgcc-ng[version='>=11.2.0|>=7.5.0|>=7.3.0|>=7.2.0']
pip -> python[version='>=3.8,<3.9.0a0'] -> libgcc-ng[version='>=11.2.0|>=7.5.0|>=7.3.0|>=7.2.0']
numpy -> libgcc-ng[version='>=11.2.0|>=7.5.0|>=7.3.0|>=7.2.0|>=12']
tbb -> libgcc-ng[version='>=11.2.0|>=7.5.0|>=7.3.0|>=7.2.0|>=12']
python=3.8 -> libgcc-ng[version='>=11.2.0|>=7.5.0|>=7.3.0']
fmlib -> libgcc-ng[version='>=12']
sundials -> suitesparse[version='>=5.10.1,<6.0a0'] -> libgcc-ng[version='>=11.2.0|>=7.5.0|>=9.4.0']
scipy -> libopenblas[version='>=0.3.2,<0.3.3.0a0'] -> libgcc-ng[version='>=8.2.0']
libhwloc -> libgcc-ng[version='>=12']
scipy -> libgcc-ng[version='>=11.2.0|>=7.5.0|>=7.3.0|>=7.2.0|>=12']
conda -> conda-package-handling[version='>=1.3.0'] -> libgcc-ng[version='>=11.2.0|>=7.5.0|>=7.3.0|>=7.2.0']
libhwloc -> libxml2[version='>=2.9.14,<2.11.0a0'] -> libgcc-ng[version='>=7.5.0']
pyfmi -> lxml -> libgcc-ng[version='>=11.2.0|>=7.5.0|>=7.3.0|>=7.2.0']
conda[version='>=22.11.1'] -> conda-package-handling[version='>=1.3.0'] -> libgcc-ng[version='>=11.2.0|>=7.5.0|>=7.3.0|>=7.2.0']
python=3.8 -> zlib[version='>=1.2.11,<1.3.0a0'] -> libgcc-ng[version='>=7.2.0']
suitesparse -> libgcc-ng[version='>=11.2.0|>=7.5.0|>=7.3.0|>=7.2.0|>=9.4.0']
pyfmi -> libgcc-ng[version='>=12']

```

Package pip conflicts for:

```

conda-content-trust -> python[version='>=3.7,<3.8.0a0'] -> pip
assimulo -> python[version='>=3.8,<3.9.0a0'] -> pip
pyfmi -> python[version='>=3.8,<3.9.0a0'] -> pip
certifi -> python[version='>=3.9,<3.10.0a0'] -> pip
scipy -> python[version='>=3.9,<3.10.0a0'] -> pip
wheel -> python -> pip
conda[version='>=22.11.1'] -> python[version='>=3.9,<3.10.0a0'] -> pip
python=3.8 -> pip
setuptools -> python[version='>=3.10,<3.11.0a0'] -> pip

```

Package libblas conflicts for:

```

assimulo -> libblas[version='>=3.9.0,<4.0a0']
liblapack -> libblas==3.9.0=16_linux64_openblas
sundials -> libblas[version='>=3.9.0,<4.0a0']
suitesparse -> libblas[version='>=3.8.0,<4.0a0']

```

```

scipy -> libblas[version='>=3.9.0,<4.0a0']
scipy -> libcbblas[version='>=3.9.0,<4.0a0'] -> libblas==3.9.0=16_linux64_openblas
sundials -> liblapack[version='>=3.9.0,<4.0a0'] -> libblas[version='3.9.0|>=3.8.0,<4.0a0',build=16_linux64_openblas]
pyfmi -> assimulo[version='>=3.0'] -> libblas[version='>=3.9.0,<4.0a0']
suitesparse -> libcbblas[version='>=3.8.0,<4.0a0'] -> libblas==3.9.0=16_linux64_openblas
assimulo -> liblapack[version='>=3.9.0,<4.0a0'] -> libblas==3.9.0=16_linux64_openblas
libcbblas -> libblas==3.9.0=16_linux64_openblas

```

Package libgfortran-ng conflicts for:

```

numpy -> libgfortran-ng[version='>=7,<8.0a0|>=7.2.0,<8.0a0']
assimulo -> libgfortran-ng
scipy -> libopenblas[version='>=0.3.2,<0.3.3.0a0'] -> libgfortran-ng[version='>=8,<9.0a0']
pyfmi -> assimulo[version='>=3.0'] -> libgfortran-ng[version='>=7,<8.0a0|>=7.2.0,<8.0a0']
suitesparse -> libopenblas[version='>=0.3.20,<1.0a0'] -> libgfortran-ng[version='>=7,<8.0a0|>=7.2.0,<8.0a0']
assimulo -> scipy -> libgfortran-ng[version='>=7,<8.0a0|>=7.2.0,<8.0a0']
scipy -> libgfortran-ng[version='>=7,<8.0a0|>=7.2.0,<8.0a0']
numpy -> libopenblas[version='>=0.3.2,<0.3.3.0a0'] -> libgfortran-ng[version='>=8,<9.0a0']
libopenblas -> libgfortran-ng[version='>=7,<8.0a0|>=8,<9.0a0|>=7.2.0,<8.0a0']
libblas -> libopenblas[version='>=0.3.21,<0.3.22.0a0'] -> libgfortran-ng

```

Package enum34 conflicts for:

```

conda -> enum34
conda-content-trust -> cryptography -> enum34

```

Package _libgcc_mutex conflicts for:

```

openssl -> libgcc-ng[version='>=7.5.0'] -> _libgcc_mutex[version='*|0.1',build=main]
numpy -> libgcc-ng[version='>=11.2.0'] -> _libgcc_mutex[version='*|0.1',build=main]
python=3.8 -> libgcc-ng[version='>=11.2.0'] -> _libgcc_mutex[version='*|0.1',build=main]
suitesparse -> libgcc-ng[version='>=11.2.0'] -> _libgcc_mutex[version='*|0.1',build=main]
scipy -> libgcc-ng[version='>=11.2.0'] -> _libgcc_mutex[version='*|0.1',build=main]
tbb -> libgcc-ng[version='>=11.2.0'] -> _libgcc_mutex[version='*|0.1',build=main]
libopenblas -> libgcc-ng[version='>=11.2.0'] -> _libgcc_mutex[version='*|0.1',build=main]

```

Package requests conflicts for:

```

conda[version='>=22.11.1'] -> requests[version='>=2.20.1,<3']
conda -> requests[version='>=2.12.4|>=2.12.4,<3|>=2.18.4,<3|>=2.20.1,<3|>=2.14.2,<3']
scipy -> pooch -> requests[version='>=2.19.0']

```

Package zlib conflicts for:

```

conda[version='>=22.11.1'] -> python[version='>=3.9,<3.10.0a0'] -> zlib[version='>=1.2.11,<1.3.0a0|>=1.2.12,<1.3.0a0|>=1.2.13,<1.3.0a0']
conda-content-trust -> python[version='>=3.7,<3.8.0a0'] -> zlib[version='>=1.2.11,<1.3.0a0|>=1.2.12,<1.3.0a0|>=1.2.13,<1.3.0a0']

```

```

assimulo -> python[version='>=3.8,<3.9.0a0'] -> zlib[version='>=1.2.11,<1.3.0a0|>=1.2.12,<1.3.0a0|>=1.2.13,<1.3.0a0']
python=3.8 -> zlib[version='>=1.2.11,<1.3.0a0|>=1.2.12,<1.3.0a0|>=1.2.13,<1.3.0a0']
pyfmi -> python[version='>=3.8,<3.9.0a0'] -> zlib[version='>=1.2.11,<1.3.0a0|>=1.2.12,<1.3.0a0|>=1.2.13,<1.3.0a0']
conda -> python[version='>=3.9,<3.10.0a0'] -> zlib[version='>=1.2.11,<1.3.0a0|>=1.2.12,<1.3.0a0|>=1.2.13,<1.3.0a0']
numpy -> python[version='>=3.9,<3.10.0a0'] -> zlib[version='>=1.2.11,<1.3.0a0|>=1.2.12,<1.3.0a0|>=1.2.13,<1.3.0a0']
libhwloc -> libxml2[version='>=2.9.14,<2.11.0a0'] -> zlib[version='>=1.2.12,<1.3.0a0']
setuptools -> python[version='>=3.10,<3.11.0a0'] -> zlib[version='>=1.2.11,<1.3.0a0|>=1.2.12,<1.3.0a0|>=1.2.13,<1.3.0a0']
pip -> python[version='>=3.8,<3.9.0a0'] -> zlib[version='>=1.2.11,<1.3.0a0|>=1.2.12,<1.3.0a0|>=1.2.13,<1.3.0a0']
certifi -> python[version='>=3.9,<3.10.0a0'] -> zlib[version='>=1.2.11,<1.3.0a0|>=1.2.12,<1.3.0a0|>=1.2.13,<1.3.0a0']
scipy -> python[version='>=3.9,<3.10.0a0'] -> zlib[version='>=1.2.11,<1.3.0a0|>=1.2.12,<1.3.0a0|>=1.2.13,<1.3.0a0']
wheel -> python -> zlib[version='>=1.2.11,<1.3.0a0|>=1.2.12,<1.3.0a0|>=1.2.13,<1.3.0a0']

```

Package libstdcxx-ng conflicts for:

```

sundials -> libstdcxx-ng[version='>=12']
conda[version='>=22.11.1'] -> python[version='>=3.9,<3.10.0a0'] -> libstdcxx-ng[version='>=11.2.0|>=7.5.0|>=7.3.0|>=7.2.0']
suitesparse -> tbb[version='>=2020.3'] -> libstdcxx-ng[version='>=12']
conda -> python[version='>=3.9,<3.10.0a0'] -> libstdcxx-ng[version='>=11.2.0|>=7.5.0|>=7.3.0|>=7.2.0']
conda-content-trust -> python[version='>=3.7,<3.8.0a0'] -> libstdcxx-ng[version='>=11.2.0|>=7.2.0|>=7.3.0|>=7.5.0']
python=3.8 -> libffi[version='>=3.2.1,<3.3a0'] -> libstdcxx-ng[version='>=7.2.0']
libopenblas -> libstdcxx-ng[version='>=11.2.0|>=7.5.0']
fmlib -> libstdcxx-ng[version='>=12']
setuptools -> python[version='>=3.9,<3.10.0a0'] -> libstdcxx-ng[version='>=11.2.0|>=7.5.0|>=7.3.0|>=7.2.0']
scipy -> libstdcxx-ng[version='>=11.2.0|>=7.5.0|>=7.3.0|>=7.2.0|>=12']
assimulo -> numpy[version='>=1.20.3,<2.0a0'] -> libstdcxx-ng[version='>=11.2.0|>=7.5.0|>=12|>=7.3.0|>=7.2.0']
libblas -> libopenblas[version='>=0.3.21,<0.3.22.0a0'] -> libstdcxx-ng[version='>=11.2.0']
sundials -> suitesparse[version='>=5.10.1,<6.0a0'] -> libstdcxx-ng[version='>=11.2.0|>=7.5.0|>=9.4.0']
pyfmi -> fmlib[version='>=2.4.1,<2.5.0a0'] -> libstdcxx-ng[version='>=11.2.0|>=12|>=7.5.0|>=7.3.0|>=7.2.0']
libhwloc -> libstdcxx-ng[version='>=12']
pip -> python[version='>=3.8,<3.9.0a0'] -> libstdcxx-ng[version='>=11.2.0|>=7.5.0|>=7.3.0|>=7.2.0']
tbb -> libstdcxx-ng[version='>=11.2.0|>=7.5.0|>=7.3.0|>=7.2.0|>=12']
certifi -> python[version='>=3.9,<3.10.0a0'] -> libstdcxx-ng[version='>=11.2.0|>=7.5.0|>=7.3.0|>=7.2.0']
wheel -> python -> libstdcxx-ng[version='>=11.2.0|>=7.5.0|>=7.3.0|>=7.2.0']
numpy -> mkl_fft -> libstdcxx-ng[version='>=7.2.0|>=7.3.0']
python=3.8 -> libstdcxx-ng[version='>=11.2.0|>=7.5.0|>=7.3.0']
numpy -> libstdcxx-ng[version='>=11.2.0|>=7.5.0|>=12']
suitesparse -> libstdcxx-ng[version='>=11.2.0|>=7.5.0|>=7.3.0|>=7.2.0|>=9.4.0']

```

Package libgfortran5 conflicts for:

```
libopenblas -> libgfortran-ng -> libgfortran5[version='11.2.0.*|9.3.0.*|
8.4.0.*|12.2.0',build=h337968e_19]
libopenblas -> libgfortran5[version='>=10.4.0|>=11.2.0']
```

Package libopenblas conflicts for:

```
libblas -> libopenblas[version='>=0.3.21,<0.3.22.0a0|>=0.3.21,<1.0a0']
assimulo -> libblas[version='>=3.9.0,<4.0a0'] -> libopenblas[version='>=
0.2.20,<0.2.21.0a0|>=0.3.2,<0.3.3.0a0|>=0.3.20,<1.0a0|>=0.3.21,<0.3.22.0
a0|>=0.3.21,<1.0a0|>=0.3.3,<1.0a0']
suitesparse -> libblas[version='>=3.8.0,<4.0a0'] -> libopenblas[version
='>=0.3.21,<0.3.22.0a0|>=0.3.21,<1.0a0']
pyfmi -> numpy[version='>=1.20.3,<2.0a0'] -> libopenblas[version='>=0.2.
20,<0.2.21.0a0|>=0.3.2,<0.3.3.0a0|>=0.3.20,<1.0a0|>=0.3.3,<1.0a0|>=0.3.2
1,<1.0a0']
scipy -> libopenblas[version='>=0.2.20,<0.2.21.0a0|>=0.3.2,<0.3.3.0a0|>=
0.3.20,<1.0a0|>=0.3.21,<1.0a0|>=0.3.3,<1.0a0']
scipy -> libblas[version='>=3.9.0,<4.0a0'] -> libopenblas[version='>=0.
3.21,<0.3.22.0a0']
suitesparse -> libopenblas[version='>=0.2.20,<0.2.21.0a0|>=0.3.20,<1.0a0
|>=0.3.3,<1.0a0']
libcblas -> libblas==3.9.0=16_linux64_openblas -> libopenblas[version='>
=0.3.21,<0.3.22.0a0|>=0.3.21,<1.0a0']
liblapack -> libblas==3.9.0=16_linux64_openblas -> libopenblas[version
='>=0.3.21,<0.3.22.0a0|>=0.3.21,<1.0a0']
sundials -> libblas[version='>=3.9.0,<4.0a0'] -> libopenblas[version='>=
0.3.20,<1.0a0|>=0.3.21,<0.3.22.0a0|>=0.3.21,<1.0a0|>=0.3.3,<1.0a0']
```

Package liblapack conflicts for:

```
pyfmi -> assimulo[version='>=3.0'] -> liblapack[version='>=3.9.0,<4.0a
0']
assimulo -> liblapack[version='>=3.9.0,<4.0a0']
sundials -> suitesparse[version='>=5.10.1,<6.0a0'] -> liblapack[version
='>=3.8.0,<4.0a0']
sundials -> liblapack[version='>=3.9.0,<4.0a0']
scipy -> liblapack[version='>=3.9.0,<4.0a0']
suitesparse -> liblapack[version='>=3.8.0,<4.0a0']
```

Package intel-openmp conflicts for:

```
suitesparse -> mkl[version='>=2021.4.0,<2022.0a0'] -> intel-openmp=2021
scipy -> mkl[version='>=2021.4.0,<2022.0a0'] -> intel-openmp=2021
pyfmi -> scipy -> intel-openmp[version='>=2021.4.0,<2022.0a0']
scipy -> intel-openmp[version='>=2021.4.0,<2022.0a0']
assimulo -> scipy -> intel-openmp[version='>=2021.4.0,<2022.0a0']
numpy -> mkl[version='>=2021.4.0,<2022.0a0'] -> intel-openmp[version='20
21.*|2022.*']
```

Package openssl conflicts for:

```
scipy -> python[version='>=3.9,<3.10.0a0'] -> openssl[version='1.0.*|>=
1.0.2m,<1.0.3a|>=1.0.2n,<1.0.3a|>=1.0.2o,<1.0.3a|>=1.0.2p,<1.0.3a|>=1.1.
1a,<1.1.2a|>=1.1.1b,<1.1.2a|>=1.1.1c,<1.1.2a|>=1.1.1d,<1.1.2a|>=1.1.1e,<
1.1.2a|>=1.1.1g,<1.1.2a|>=1.1.1h,<1.1.2a|>=1.1.1i,<1.1.2a|>=1.1.1j,<1.1.
2a|>=1.1.1k,<1.1.2a|>=1.1.1l,<1.1.2a|>=1.1.1n,<1.1.2a|>=1.1.1o,<1.1.2a|>
=1.1.1q,<1.1.2a|>=1.1.1s,<1.1.2a|>=1.1.1m,<1.1.2a|>=1.0.2l,<1.0.3a']
python=3.8 -> openssl[version='>=1.1.1d,<1.1.2a|>=1.1.1e,<1.1.2a|>=1.1.1
g,<1.1.2a|>=1.1.1j,<1.1.2a|>=1.1.1k,<1.1.2a|>=1.1.1l,<1.1.2a|>=1.1.1n,<
1.1.2a|>=1.1.1q,<1.1.2a|>=1.1.1s,<1.1.2a']
setuptools -> python[version='>=3.10,<3.11.0a0'] -> openssl[version='1.
0.*|>=1.0.2m,<1.0.3a|>=1.0.2n,<1.0.3a|>=1.0.2o,<1.0.3a|>=1.0.2p,<1.0.3a|
```



```

>=1.1.1a,<1.1.2a|>=1.1.1b,<1.1.2a|>=1.1.1c,<1.1.2a|>=1.1.1d,<1.1.2a|>=1.1.1e,<1.1.2a|>=1.1.1g,<1.1.2a|>=1.1.1h,<1.1.2a|>=1.1.1i,<1.1.2a|>=1.1.1j,<1.1.2a|>=1.1.1k,<1.1.2a|>=1.1.1l,<1.1.2a|>=1.1.1m,<1.1.2a|>=1.1.1n,<1.1.2a|>=1.1.1q,<1.1.2a|>=1.1.1s,<1.1.2a|>=1.1.1o,<1.1.2a|>=1.0.2l,<1.0.3a']
wheel -> python -> openssl[version='1.0.*|>=1.0.2m,<1.0.3a|>=1.0.2n,<1.0.3a|>=1.0.2o,<1.0.3a|>=1.0.2p,<1.0.3a|>=1.1.1a,<1.1.2a|>=1.1.1b,<1.1.2a|>=1.1.1c,<1.1.2a|>=1.1.1d,<1.1.2a|>=1.1.1e,<1.1.2a|>=1.1.1g,<1.1.2a|>=1.1.1h,<1.1.2a|>=1.1.1i,<1.1.2a|>=1.1.1j,<1.1.2a|>=1.1.1k,<1.1.2a|>=1.1.1l,<1.1.2a|>=1.1.1m,<1.1.2a|>=1.1.1n,<1.1.2a|>=1.1.1q,<1.1.2a|>=1.1.1s,<1.1.2a|>=1.1.1o,<1.1.2a|>=1.0.2l,<1.0.3a']
pip -> python[version='>=3.8,<3.9.0a0'] -> openssl[version='1.0.*|>=1.0.2m,<1.0.3a|>=1.0.2n,<1.0.3a|>=1.0.2o,<1.0.3a|>=1.0.2p,<1.0.3a|>=1.1.1a,<1.1.2a|>=1.1.1b,<1.1.2a|>=1.1.1c,<1.1.2a|>=1.1.1d,<1.1.2a|>=1.1.1e,<1.1.2a|>=1.1.1g,<1.1.2a|>=1.1.1j,<1.1.2a|>=1.1.1k,<1.1.2a|>=1.1.1l,<1.1.2a|>=1.1.1n,<1.1.2a|>=1.1.1q,<1.1.2a|>=1.1.1s,<1.1.2a|>=1.1.1m,<1.1.2a|>=1.1.1o,<1.1.2a|>=1.1.1i,<1.1.2a|>=1.1.1h,<1.1.2a|>=1.0.2l,<1.0.3a']
certifi -> python[version='>=3.9,<3.10.0a0'] -> openssl[version='1.0.*|>=1.0.2m,<1.0.3a|>=1.0.2n,<1.0.3a|>=1.0.2o,<1.0.3a|>=1.0.2p,<1.0.3a|>=1.1.1a,<1.1.2a|>=1.1.1b,<1.1.2a|>=1.1.1c,<1.1.2a|>=1.1.1d,<1.1.2a|>=1.1.1e,<1.1.2a|>=1.1.1g,<1.1.2a|>=1.1.1h,<1.1.2a|>=1.1.1i,<1.1.2a|>=1.1.1j,<1.1.2a|>=1.1.1k,<1.1.2a|>=1.1.1l,<1.1.2a|>=1.1.1n,<1.1.2a|>=1.1.1o,<1.1.2a|>=1.1.1q,<1.1.2a|>=1.1.1s,<1.1.2a|>=1.1.1m,<1.1.2a|>=1.0.2l,<1.0.3a']
conda -> python[version='>=3.9,<3.10.0a0'] -> openssl[version='1.0.*|>=1.0.2m,<1.0.3a|>=1.0.2n,<1.0.3a|>=1.0.2o,<1.0.3a|>=1.0.2p,<1.0.3a|>=1.1.1a,<1.1.2a|>=1.1.1b,<1.1.2a|>=1.1.1c,<1.1.2a|>=1.1.1d,<1.1.2a|>=1.1.1e,<1.1.2a|>=1.1.1g,<1.1.2a|>=1.1.1h,<1.1.2a|>=1.1.1i,<1.1.2a|>=1.1.1j,<1.1.2a|>=1.1.1k,<1.1.2a|>=1.1.1l,<1.1.2a|>=1.1.1n,<1.1.2a|>=1.1.1o,<1.1.2a|>=1.1.1q,<1.1.2a|>=1.1.1s,<1.1.2a|>=1.1.1m,<1.1.2a|>=1.0.2l,<1.0.3a']
assimulo -> python[version='>=3.8,<3.9.0a0'] -> openssl[version='>=1.1.1d,<1.1.2a|>=1.1.1e,<1.1.2a|>=1.1.1g,<1.1.2a|>=1.1.1j,<1.1.2a|>=1.1.1k,<1.1.2a|>=1.1.1l,<1.1.2a|>=1.1.1n,<1.1.2a|>=1.1.1q,<1.1.2a|>=1.1.1s,<1.1.2a|>=1.1.1o,<1.1.2a|>=1.0.2l,<1.0.3a']
conda-content-trust -> cryptography -> openssl[version='1.0.*|>=1.0.2o,<1.0.3a|>=1.0.2p,<1.0.3a|>=1.1.1a,<1.1.2a|>=1.1.1b,<1.1.2a|>=1.1.1c,<1.1.2a|>=1.1.1d,<1.1.2a|>=1.1.1g,<1.1.2a|>=1.1.1h,<1.1.2a|>=1.1.1i,<1.1.2a|>=1.1.1j,<1.1.2a|>=1.1.1k,<1.1.2a|>=1.1.1l,<1.1.2a|>=1.1.1n,<1.1.2a|>=1.1.1o,<1.1.2a|>=1.1.1q,<1.1.2a|>=1.1.1s,<1.1.2a|>=1.1.1m,<1.1.2a|>=1.0.2l,<1.0.3a']
conda[version='>=22.11.1'] -> python[version='>=3.9,<3.10.0a0'] -> openssl[version='>=1.0.2o,<1.0.3a|>=1.0.2p,<1.0.3a|>=1.1.1a,<1.1.2a|>=1.1.1b,<1.1.2a|>=1.1.1c,<1.1.2a|>=1.1.1d,<1.1.2a|>=1.1.1e,<1.1.2a|>=1.1.1g,<1.1.2a|>=1.1.1h,<1.1.2a|>=1.1.1i,<1.1.2a|>=1.1.1j,<1.1.2a|>=1.1.1k,<1.1.2a|>=1.1.1l,<1.1.2a|>=1.1.1n,<1.1.2a|>=1.1.1o,<1.1.2a|>=1.1.1q,<1.1.2a|>=1.1.1s,<1.1.2a|>=1.1.1m,<1.1.2a|>=1.0.2l,<1.0.3a']
pyfmi -> python[version='>=3.8,<3.9.0a0'] -> openssl[version='>=1.1.1d,<1.1.2a|>=1.1.1e,<1.1.2a|>=1.1.1g,<1.1.2a|>=1.1.1j,<1.1.2a|>=1.1.1k,<1.1.2a|>=1.1.1l,<1.1.2a|>=1.1.1n,<1.1.2a|>=1.1.1q,<1.1.2a|>=1.1.1s,<1.1.2a|>=1.1.1o,<1.1.2a|>=1.0.2l,<1.0.3a']

```

Package libxml2 conflicts for:

```

tbb -> libhwloc[version='>=2.8.0,<2.8.1.0a0'] -> libxml2[version='>=2.9.14,<2.11.0a0']
libhwloc -> libxml2[version='>=2.9.14,<2.11.0a0']
pyfmi -> lxml -> libxml2[version='>=2.9.10,<2.10.0a0|>=2.9.12,<2.10.0a0|>=2.9.14,<2.10.0a0|>=2.9.2,!>=2.9.11,!>=2.9.12|>=2.9.9,<2.10.0a0|>=2.9.8,<2.10.0a0|>=2.9.7,<2.10.0a0|>=2.9.4,<2.10.0a0']

```

Package six conflicts for:

```

numpy -> mkl-service[version='>=2.3.0,<3.0a0'] -> six
conda-content-trust -> cryptography -> six[version='>=1.4.1']

```

```
conda -> conda-package-handling[version='>=1.3.0'] -> six[version='>=1.5.2']
suitesparse -> mkl-service[version='>=2.3.0,<3.0a0'] -> six
conda-content-trust -> six
scipy -> mkl-service[version='>=2.3.0,<3.0a0'] -> six
conda[version='>=22.11.1'] -> conda-package-handling[version='>=1.3.0']
-> six[version='>=1.5.2']
```

Package suitesparse conflicts for:

```
assimulo -> sundials[version='>=6.4.0,<6.5.0a0'] -> suitesparse[version='>=5.10.1,<6.0a0']
sundials -> suitesparse[version='>=5.10.1,<6.0a0']
```

Package scipy conflicts for:

```
pyfmi -> scipy
assimulo -> scipy
```

Package libgfortran4 conflicts for:

```
pyfmi -> scipy -> libgfortran4[version='>=7.5.0']
scipy -> libgfortran4[version='>=7.5.0']
numpy -> libopenblas[version='>=0.3.3,<1.0a0'] -> libgfortran4[version='7.5.0.*|>=7.5.0']
libopenblas -> libgfortran4[version='>=7.5.0']
assimulo -> libgfortran-ng -> libgfortran4[version='7.5.0.*|>=7.5.0']
scipy -> libgfortran-ng -> libgfortran4=7.5.0
suitesparse -> libopenblas[version='>=0.3.3,<1.0a0'] -> libgfortran4[version='>=7.5.0']
libopenblas -> libgfortran-ng -> libgfortran4=7.5.0
```

Package ca-certificates conflicts for:

```
python=3.8 -> openssl[version='>=1.1.1s,<1.1.2a'] -> ca-certificates
wheel -> python -> ca-certificates
conda-content-trust -> python -> ca-certificates
scipy -> python[version='>=2.7,<2.8.0a0'] -> ca-certificates
pip -> python[version='>=2.7,<2.8.0a0'] -> ca-certificates
certifi -> python -> ca-certificates
conda -> python[version='>=2.7,<2.8.0a0'] -> ca-certificates
openssl -> ca-certificates
setuptools -> python[version='>=2.7,<2.8.0a0'] -> ca-certificates
```

Package libcbblas conflicts for:

```
scipy -> libcbblas[version='>=3.9.0,<4.0a0']
pyfmi -> numpy[version='>=1.20.3,<2.0a0'] -> libcbblas[version='>=3.9.0,<4.0a0']
assimulo -> numpy[version='>=1.20.3,<2.0a0'] -> libcbblas[version='>=3.9.0,<4.0a0']
sundials -> suitesparse[version='>=5.10.1,<6.0a0'] -> libcbblas[version='>=3.8.0,<4.0a0']
suitesparse -> libcbblas[version='>=3.8.0,<4.0a0']
```

Package mkl-service conflicts for:

```
numpy -> mkl-service[version='>=2,<3.0a0|>=2.3.0,<3.0a0']
assimulo -> numpy[version='>=1.20.3,<2.0a0'] -> mkl-service[version='>=2,<3.0a0|>=2.3.0,<3.0a0']
suitesparse -> mkl-service[version='>=2.3.0,<3.0a0']
sundials -> suitesparse[version='>=5.10.1,<6.0a0'] -> mkl-service[version='>=2.3.0,<3.0a0']
pyfmi -> numpy[version='>=1.20.3,<2.0a0'] -> mkl-service[version='>=2,<3.0a0|>=2.3.0,<3.0a0']
scipy -> mkl-service[version='>=2,<3.0a0|>=2.3.0,<3.0a0']
```

Package cryptography conflicts for:

```
conda[version='>=22.11.1'] -> pyopenssl[version='>=16.2.0'] -> cryptography[version='>=1.9|>=2.1.4|>=2.2.1|>=2.8|>=3.3|>=35.0']
conda-content-trust -> cryptography
conda -> pyopenssl[version='>=16.2.0'] -> cryptography[version='>=1.9|>=2.1.4|>=2.2.1|>=2.8|>=3.3|>=35.0']
```

Package libuuid conflicts for:

```
conda[version='>=22.11.1'] -> python[version='>=3.10,<3.11.0a0'] -> libuuid[version='>=1.0.3,<2.0a0|>=1.41.5,<2.0a0']
conda -> python[version='>=3.10,<3.11.0a0'] -> libuuid[version='>=1.0.3,<2.0a0|>=1.41.5,<2.0a0']
pip -> python[version='>=3.10,<3.11.0a0'] -> libuuid[version='>=1.0.3,<2.0a0|>=1.41.5,<2.0a0']
wheel -> python -> libuuid[version='>=1.0.3,<2.0a0|>=1.41.5,<2.0a0']
numpy -> python[version='>=3.10,<3.11.0a0'] -> libuuid[version='>=1.0.3,<2.0a0|>=1.41.5,<2.0a0']
certifi -> python[version='>=3.10,<3.11.0a0'] -> libuuid[version='>=1.0.3,<2.0a0|>=1.41.5,<2.0a0']
conda-content-trust -> python[version='>=3.10,<3.11.0a0'] -> libuuid[version='>=1.0.3,<2.0a0|>=1.41.5,<2.0a0']
scipy -> python[version='>=3.10,<3.11.0a0'] -> libuuid[version='>=1.0.3,<2.0a0|>=1.41.5,<2.0a0']
setuptools -> python[version='>=3.10,<3.11.0a0'] -> libuuid[version='>=1.0.3,<2.0a0|>=1.41.5,<2.0a0']
```

Package tbb conflicts for:

```
sundials -> suitesparse[version='>=5.10.1,<6.0a0'] -> tbb[version='>=2020.3|>=2021.3.0']
suitesparse -> tbb[version='>=2018.0.4,<2019.0a0|>=2019.1|>=2020.3|>=2021.3.0']
```

Package certifi conflicts for:

```
conda[version='>=22.11.1'] -> requests[version='>=2.20.1,<3'] -> certifi[version='>=2016.09|>=2016.9.26|>=2017.4.17']
setuptools -> certifi[version='>=2016.09|>=2016.9.26']
conda -> requests[version='>=2.20.1,<3'] -> certifi[version='>=2016.09|>=2016.9.26|>=2017.4.17']
pip -> setuptools -> certifi[version='>=2016.09|>=2016.9.26']
wheel -> setuptools -> certifi[version='>=2016.09|>=2016.9.26']
```

Package numpy conflicts for:

```
scipy -> numpy[version='>=1.11.3,<2.0a0|>=1.14.6,<2.0a0|>=1.16,<1.23|>=1.19,<1.25.0|>=1.19,<1.26.0|>=1.21,<1.26.0|>=1.21,<1.25.0|>=1.21,<1.23|>=1.16.6,<1.23.0|>=1.21.2,<1.23.0|>=1.16.6,<2.0a0|>=1.15.1,<2.0a0|>=1.9.3,<2.0a0|>=1.20.3,<1.27|>=1.20.3,<2.0a0']
pyfmi -> scipy -> numpy[version='>=1.11.3,<2.0a0|>=1.14.6,<2.0a0|>=1.16,<1.23|>=1.19,<1.25.0|>=1.19,<1.26.0|>=1.21,<1.26.0|>=1.21,<1.25.0|>=1.21,<1.23|>=1.16.6,<1.23.0|>=1.21.2,<1.23.0|>=1.16.6,<2.0a0|>=1.15.1,<2.0a0|>=1.9.3,<2.0a0|>=1.20.3,<1.27']
assimulo -> scipy -> numpy[version='>=1.11.3,<2.0a0|>=1.14.6,<2.0a0|>=1.16,<1.23|>=1.19,<1.25.0|>=1.19,<1.26.0|>=1.21,<1.26.0|>=1.21,<1.25.0|>=1.21,<1.23|>=1.16.6,<1.23.0|>=1.21.2,<1.23.0|>=1.16.6,<2.0a0|>=1.15.1,<2.0a0|>=1.9.3,<2.0a0|>=1.20.3,<1.27']
assimulo -> numpy[version='>=1.20.3,<2.0a0']
pyfmi -> numpy[version='>=1.20.3,<2.0a0']
```

Package setuptools conflicts for:

```
conda[version='>=22.11.1'] -> setuptools[version='>=31.0.1']
```

```
wheel -> setuptools
conda[version='>=22.11.1'] -> ruamel.yaml[version='>=0.11.14,<0.18'] ->
setuptools
pip -> setuptools
python=3.8 -> pip -> setuptools
```

Package libhwloc conflicts for:

```
tbb -> libhwloc[version='>=2.8.0,<2.8.1.0a0']
suitesparse -> tbb[version='>=2020.3'] -> libhwloc[version='>=2.8.0,<2.8.1.0a0']
```

Package sundials conflicts for:

```
assimulo -> sundials[version='>=6.4.0,<6.5.0a0']
pyfmi -> assimulo[version='>=3.0'] -> sundials[version='>=6.4.0,<6.5.0a0']
```

Package gmp conflicts for:

```
suitesparse -> gmp[version='>=6.1.2']
suitesparse -> mpfr[version='>=4.0.2,<5.0a0'] -> gmp[version='>=6.2.1,<7.0a0']
```

Package metis conflicts for:

```
sundials -> suitesparse[version='>=5.10.1,<6.0a0'] -> metis[version='>=5.1.0,<5.2.0a0|>=5.1.0,<6.0a0']
suitesparse -> metis[version='>=5.1.0,<5.2.0a0|>=5.1.0,<6.0a0']
```

Package wheel conflicts for:

```
python=3.8 -> pip -> wheel
pip -> wheel
```

Package mkl conflicts for:

```
suitesparse -> mkl[version='>=2018.0.3,<2019.0a0|>=2019.1,<2021.0a0|>=2021.4.0,<2022.0a0']
suitesparse -> mkl-service[version='>=2.3.0,<3.0a0'] -> mkl[version='>=2019.4,<2021.0a0|>=2021.2.0,<2022.0a0']
```

The following specifications were found to be incompatible with your system:

- feature:/linux-64::__glibc==2.31=0
- feature:|@/linux-64::__glibc==2.31=0
- assimulo -> libgfortran-ng -> __glibc[version='>=2.17']
- libopenblas -> libgcc-ng[version='>=11.2.0'] -> __glibc[version='>=2.17']
- openssl -> libgcc-ng[version='>=7.5.0'] -> __glibc[version='>=2.17']
- python=3.8 -> libgcc-ng[version='>=11.2.0'] -> __glibc[version='>=2.17']
- scipy -> libgcc-ng[version='>=11.2.0'] -> __glibc[version='>=2.17']
- suitesparse -> libgcc-ng[version='>=11.2.0'] -> __glibc[version='>=2.17']
- tbb -> libgcc-ng[version='>=11.2.0'] -> __glibc[version='>=2.17']

Your installed version is: 2.31

```
In [ ]: !conda --version
        !python --version
```

```
conda 22.11.1
Python 3.8.15
```

```
In [ ]: !conda install -c conda-forge pyfmi --yes # Install the key package
```

```
Collecting package metadata (current_repodata.json): - \ | / -
\ | / - \ | / - \ | / - \ | / - \ |
/ done
Solving environment: \ | / - \ | / - \ | / - \
| / - \ | / - \ | / - \ | / - \ | /
- \ | / - \ | / - \ | / - \ | / - \
| / - \ | / - \ | / - \ | / - \
The environment is inconsistent, please check the package plan carefully
The following packages are causing the inconsistency:
```

```
- conda-forge/linux-64::tbb==2021.7.0=h924138e_1
- conda-forge/linux-64::numpy==1.24.1=py38hab0fcb9_0
- conda-forge/linux-64::suitesparse==5.10.1=h9e50725_1
- conda-forge/linux-64::scipy==1.10.0=py38h10c12cc_0
- conda-forge/linux-64::libcbblas==3.9.0=16_linux64_openblas
- conda-forge/linux-64::libopenblas==0.3.21=threads_h78a6416_3
- conda-forge/linux-64::pyfmi==2.9.8=py38h26c90d9_1
- conda-forge/linux-64::assimulo==3.3=py38h71f17ff_1
- conda-forge/linux-64::libblas==3.9.0=16_linux64_openblas
- conda-forge/linux-64::liblapack==3.9.0=16_linux64_openblas
- conda-forge/linux-64::libhwloc==2.8.0=h32351e8_1
- conda-forge/linux-64::fmilib==2.4.1=h27087fc_0
- conda-forge/linux-64::sundials==6.4.1=h89a52a3_0
```

```
| / - \ | / - \ | / - \ | / - \ | /
- \ | / - \ | done
```

Package Plan

environment location: /usr/local

added / updated specs:

- pyfmi

The following packages will be REMOVED:

libgomp-11.2.0-h1234567_1

The following packages will be UPDATED:

```
ca-certificates      pkgs/main::ca-certificates-2022.10.11~ --> conda-fo
rge::ca-certificates-2022.12.7-ha878542_0
libgcc-ng            pkgs/main::libgcc-ng-11.2.0-h1234567_1 --> conda-fo
rge::libgcc-ng-12.2.0-h65d4601_19
libstdcxx-ng         pkgs/main::libstdcxx-ng-11.2.0-h12345~ --> conda-fo
rge::libstdcxx-ng-12.2.0-h46fd767_19
openssl              pkgs/main::openssl-1.1.1s-h7f8727e_0 --> conda-fo
rge::openssl-1.1.1s-h0b41bf4_1
```

The following packages will be SUPERSEDED by a higher-priority channel:

```
_libgcc_mutex        pkgs/main::_libgcc_mutex-0.1-main --> conda-fo
rge::_libgcc_mutex-0.1-conda_forge
_openmp_mutex         pkgs/main::_openmp_mutex-5.1-1_gnu --> conda-fo
rge::_openmp_mutex-4.5-2_kmp_llvm
certifi              pkgs/main/linux-64::certifi-2022.12.7~ --> conda-fo
rge/noarch::certifi-2022.12.7-pyhd8ed1ab_0
conda                pkgs/main::conda-22.11.1-py38h06a4308~ --> conda-fo
rge::conda-22.11.1-py38h578d9bd_1
```

Downloading and Extracting Packages

```
Preparing transaction: - done
Verifying transaction: | / done
Executing transaction: \ | / - \ | / - \ | / - \
done
```

BPL_TEST2_Fedbatch setup

Now specific installation and the run simulations. Start with connecting to Github. Then upload the two files:

- FMU - BPL_TEST2_Fedbatch_linux_om_me.fmu
- Setup-file - BPL_TEST2_Fedbatch_explore.me.py

```
In [ ]: %%bash
git clone https://github.com/janpeter19/BPL_TEST2_Fedbatch
```

Cloning into 'BPL_TEST2_Fedbatch'...

```
In [ ]: %cd BPL_TEST2_Fedbatch

/content/BPL_TEST2_Fedbatch/BPL_TEST2_Fedbatch/BPL_TEST2_Fedbatch
```

```
In [1]: run -i BPL_TEST2_Fedbatch_fmpy_explore.py
```

Linux - run FMU pre-comiled OpenModelica 1.21.0

Model for bioreactor has been setup. Key commands:

```
- par()          - change of parameters and initial values
- init()         - change initial values only
- simu()         - simulate and plot
- newplot()      - make a new plot
- show()         - show plot from previous simulation
- disp()         - display parameters and initial values from the last simulation
- describe()     - describe culture, broth, parameters, variables with values/units
```

Note that both disp() and describe() takes values from the last simulation

Brief information about a command by help(), eg help(simu)
Key system information is listed with the command system_info()

```
In [2]: %matplotlib inline
plt.rcParams['figure.figsize'] = [25/2.54, 20/2.54]
```

```
In [3]: import warnings
warnings.filterwarnings("ignore")
```

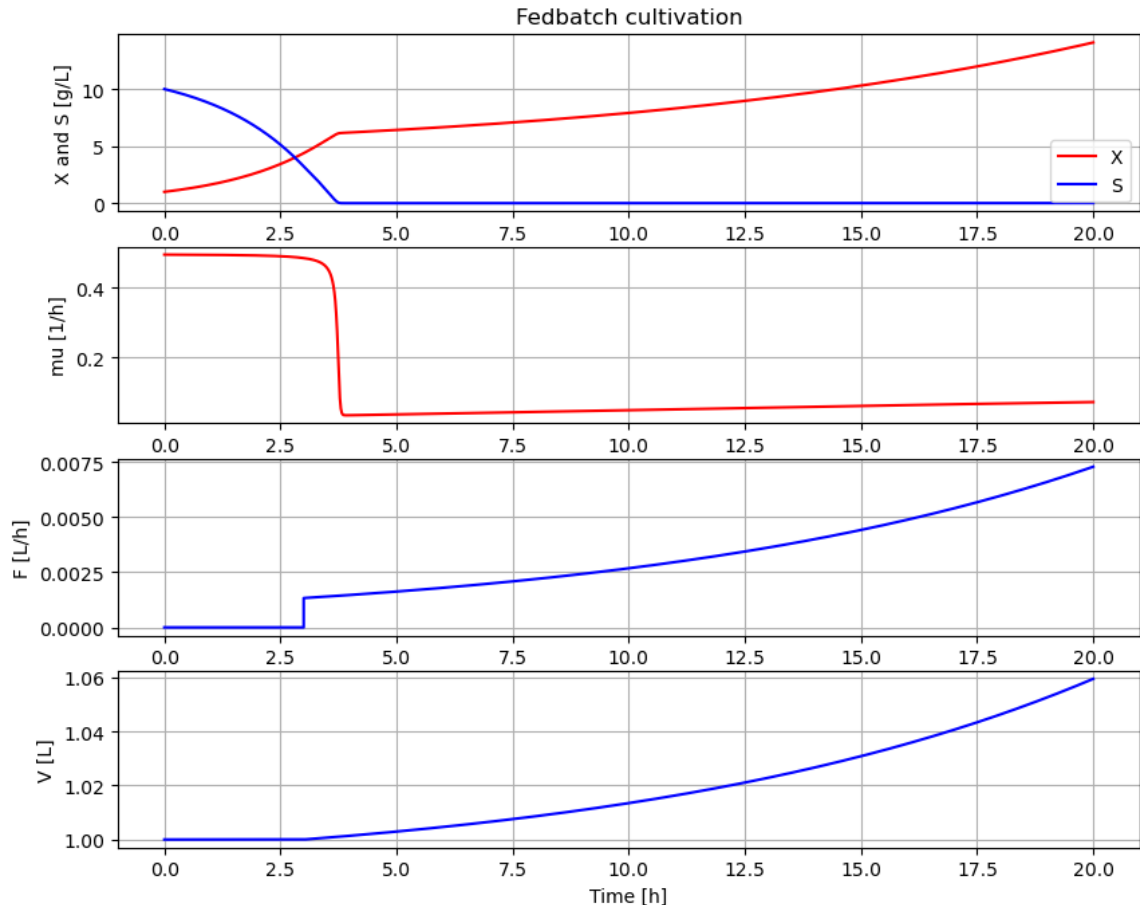
BPL_TEST2_Fedbatch - demo

```
In [4]: describe('culture'); print(); #describe('liquidphase')
```

Simplified text book model - only substrate S and cell concentration X

```
In [5]: # Simulation with default values of the process
newplot(plotType='TimeSeries')
simu(20)
```

Variable not logged
Variable not logged
Variable not logged



```
In [6]: disp(mode='long')
```

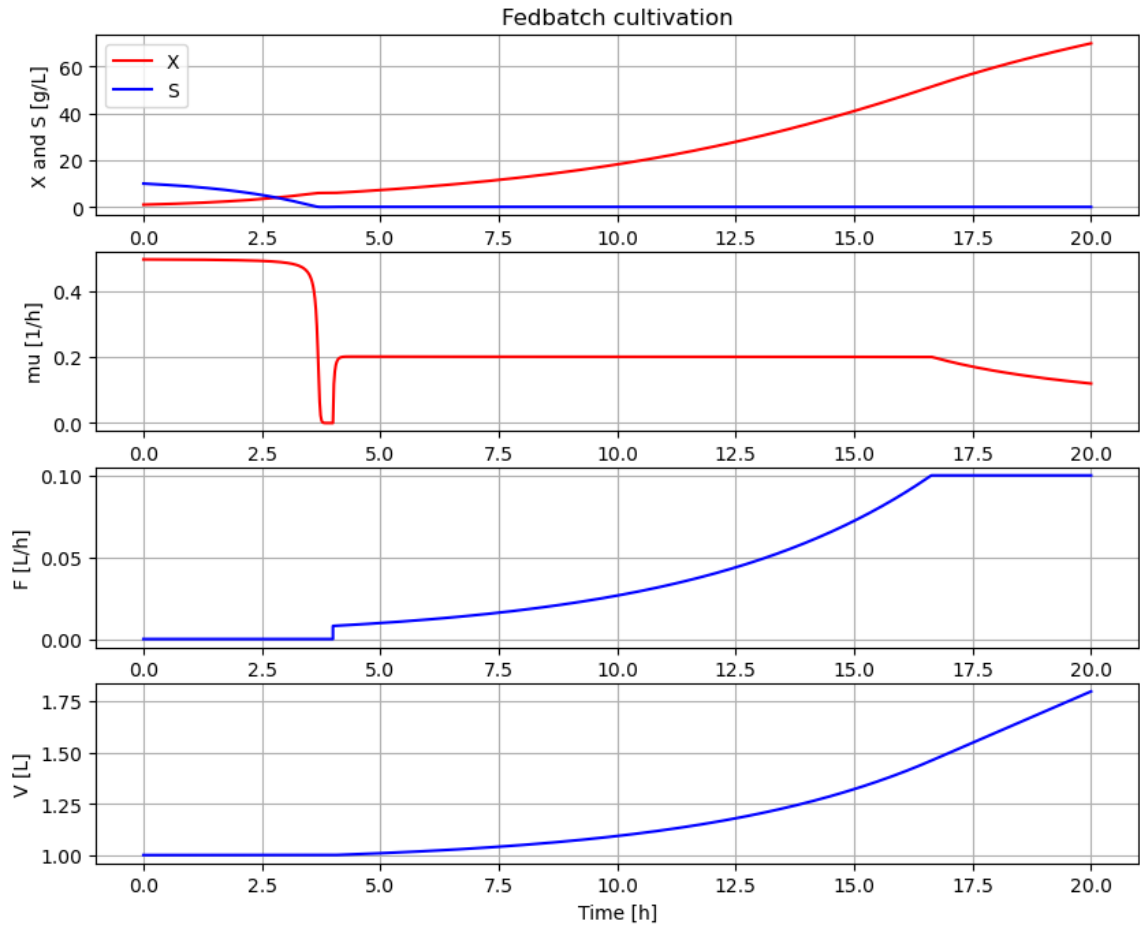
```
bioreactor.V_0 : V_0 : 1.0
bioreactor.m_0[1] : VX_0 : 0.0
bioreactor.m_0[2] : VS_0 : 0.0
bioreactor.culture.Y : Y : 0.5
bioreactor.culture.qSmax : qSmax : 1.0
bioreactor.culture.Ks : Ks : 0.1
feedtank.c_in[2] : feedtank.S_in : 0.0
feedtank.V_0 : feedtank.V_0 : 100.0
dosagescheme.mu_feed : mu_feed : 0.2
dosagescheme.t_start : t_start : 2.0
dosagescheme.F_start : F_start : 0.12
dosagescheme.F_max : F_max : 3.0
```

```
In [7]: # A more typical feed scheme for the culture at hand
newplot(plotType='TimeSeries')
par(t_start=4, F_start=0.008, mu_feed=0.2, F_max=0.1)
simu(20)
```


Variable not logged

Variable not logged

Variable not logged

In [8]: `disp('culture')`

Y : 0.5

qSmax : 1.0

Ks : 0.1

In [9]: `describe('mu')`

Cell specific growth rate variable : 0.12 [1/h]

In [10]: `describe('parts')`

['bioreactor', 'bioreactor.culture', 'dosagescheme', 'feedtank']

In [11]: `describe('MSL')`

MSL: 3.2.3 - used components: RealInput, RealOutput

In [12]: `system_info()`

System information

- OS: Linux
- Python: 3.8.16
- Scipy: not installed in the notebook
- FMPy: 0.3.15
- FMU by: OpenModelica Compiler OpenModelica 1.21.0~dev-185-g9d983b8
- FMI: 2.0
- Type: ME
- Name: BPL_TEST2.Fedbatch
- Generated: 2023-01-19T09:29:14Z
- MSL: 3.2.3
- Description: Bioprocess Library version 2.1.1-beta
- Interaction: FMU-explore for FMPy version 0.9.7b

In []: