



**Barcelona
Supercomputing
Center**
Centro Nacional de Supercomputación



Auto-EC-Earth 4 and Script Engine integration

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16/10/2025



Motivation

python based and modular, built on small classes that implement each functionality

[scriptengine](#) / [scriptengine](#) / [tasks](#) / **base** / 

 **uwefladrich** Fix [uwefladrich#61](#): Correct context update for base.getenv

This branch is 1 commit ahead of, 61 commits behind [uwefladrich/scriptengine:master](#).

Name	Last commit message
 ..	
 __init__.py	Fix uwefladrich#32 : Clean imports and get rid of namespace packages
 chdir.py	Add scriptengine.tasks.core package
 command.py	Fix uwefladrich#48 : stdout/stderr handling of base.command
 context.py	Fix uwefladrich#55 : base.include messes up the context
 echo.py	Add scriptengine.tasks.core package
 envvars.py	Fix uwefladrich#61 : Correct context update for base.getenv
 exit.py	Fix uwefladrich#30 : ScriptEngineStopException logging
 file.py	Fix uwefladrich#39 (again) and release 0.8.5
 find.py	Add scriptengine.tasks.core package
 include.py	Minor improvement of function structure
 task_timer.py	Update documentation
 template.py	Fix uwefladrich#46 : Add 'executable' argument to base.template
 time.py	Add scriptengine.tasks.core package

Motivation

python based and modular, built on small classes that implement each functionality

[scriptengine](#) / [scriptengine](#) / [tasks](#) / [base](#) /

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include.py	Minor improvement of function structure
task_timer.py	Update documentation
template.py	Fix uwefladrich#46 : Add 'executable' argument to base.template
time.py	Add scriptengine.tasks.core package

yml based configuration files, with logic clauses available

```
- when: job.launch.method in ["slurm-hetjob", "slurm-mp-taskset", "slurm-shell"]
  base.context:
    job:
      oifs:
        ntasks: 288
        ntasks_per_node: 16
        omp_num_threads: 1
        omp_stacksize: "64M"
      nemo:
        ntasks: 96
        ntasks_per_node: 16
      xios:
        ntasks: 2
        ntasks_per_node: 2

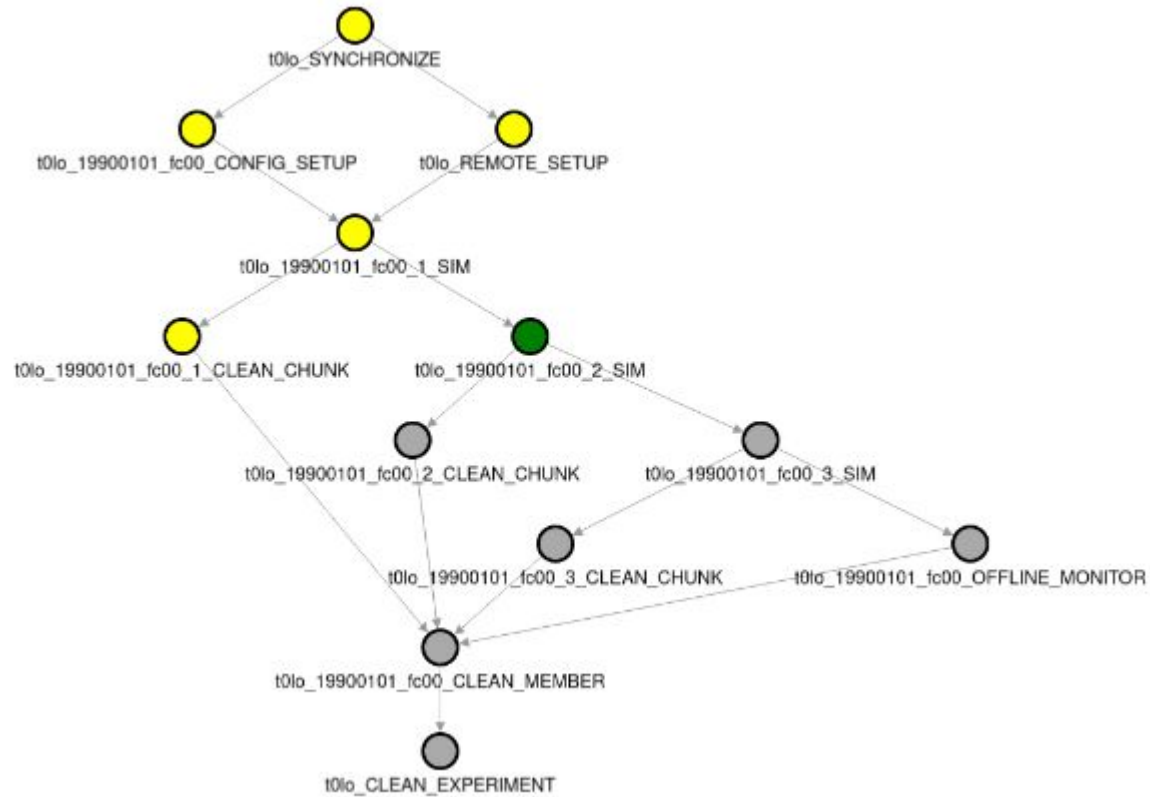
- when: job.launch.method in ["slurm-wrapper-taskset"]
  base.context:
    job:
      oifs:
        omp_num_threads: 1
        omp_stacksize: "64M"
        use_hyperthreads: false
      groups:
        - { nodes: 1, xios: 2, oifs: 125, rnmf: 1 }
        - { nodes: 1, oifs: 38, nemo: 90 }
```

Motivation

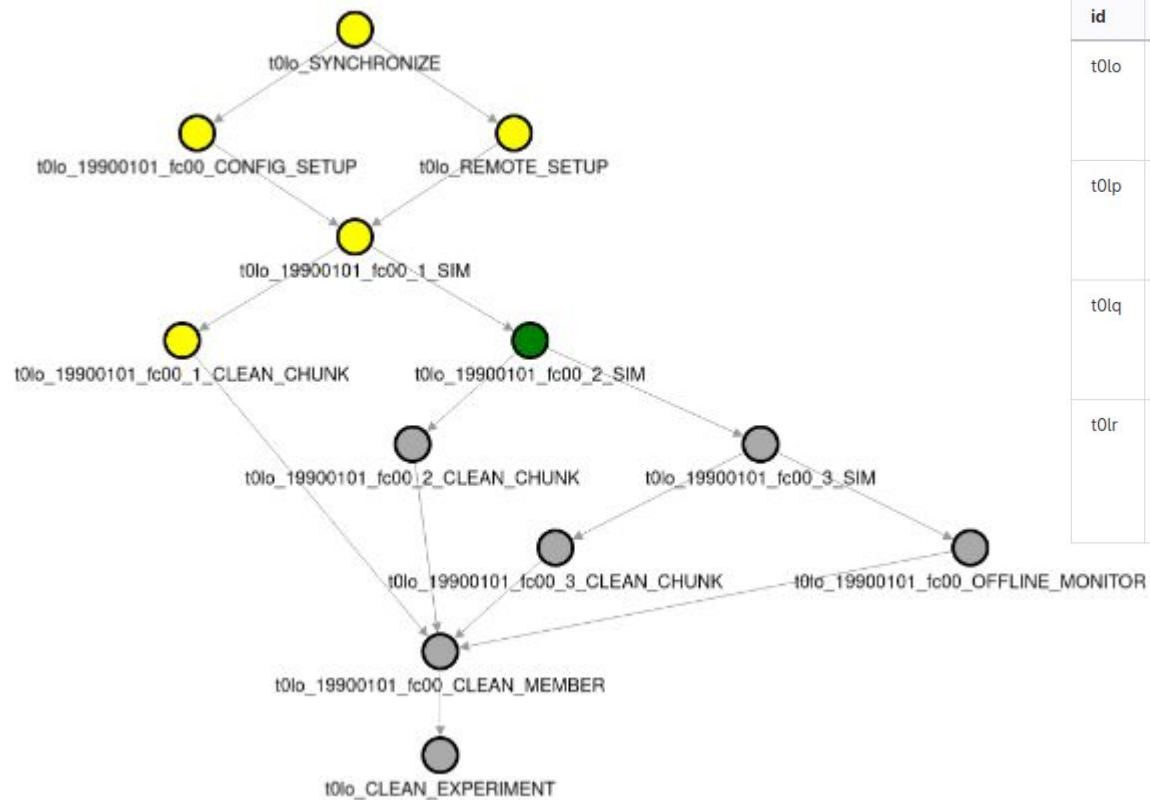
EC-Earth 4 readthedocs documentation to run with Script Engine

```
se> se my-user-config.yml my-platform-config.yml my-experiment-config.yml scriptlib/main.yml
```

Motivation



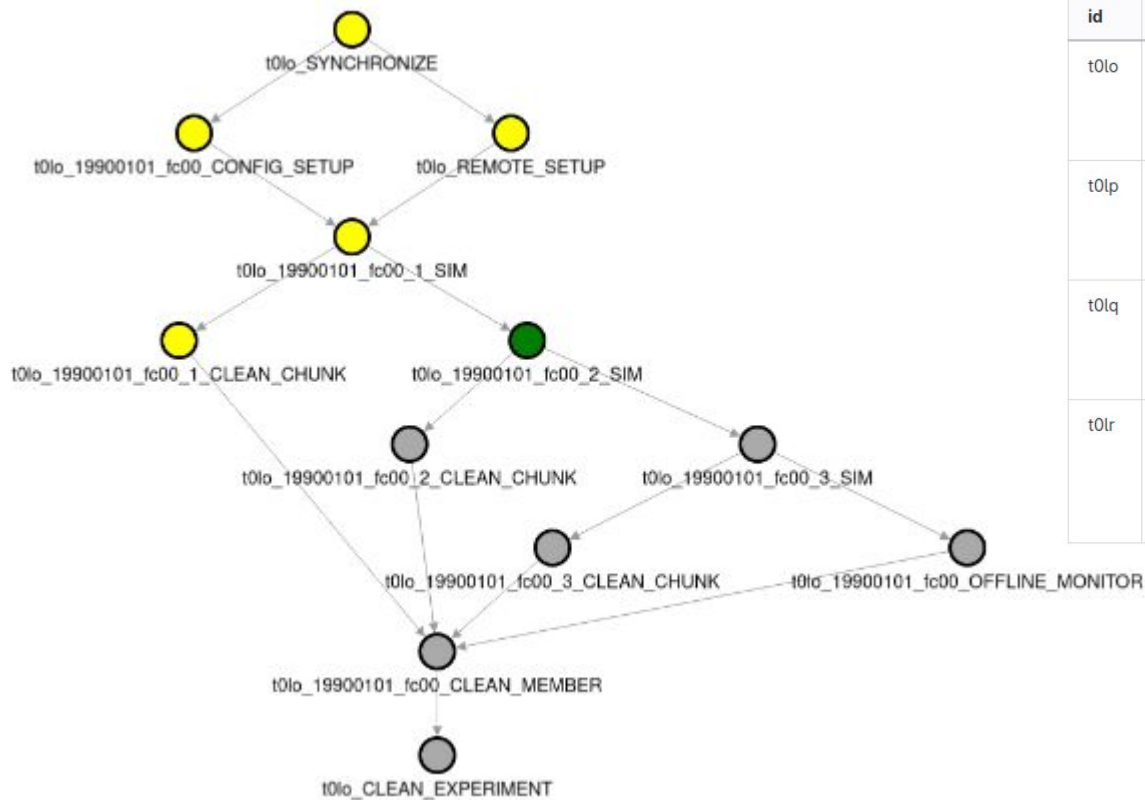
Motivation



test id	status	job	issue	details	hpc
t0lo	RUNNING	t0lo_19900101_fc00_2_SIM t0lo_19900101_fc00_1_CLEAN_CHUNK		Weekly test case: GCM default (TL255-eORCA1) - 3 years test MN5	bsc- marenostrum5
t0lp	FAILED	t0lp_19900101_fc00_1_SIM		Weekly test case: AMIP default (TL255) - 2 months test MN5	bsc- marenostrum5
t0lq	Successful			Weekly test case: OMIP default (eORCA1) - 2 months test MN5	bsc- marenostrum5
t0lr	FAILED	t0lr_SYNCHRONIZE		Weekly test case: GCM default (TL255-eORCA1) - 2 months test HPC2020	ecmwf- hpc2020



Motivation



test id	status	job	issue	details	hpc
t0lo	RUNNING	t0lo_19900101_fc00_2_SIM t0lo_19900101_fc00_1_CLEAN_CHUNK		Weekly test case: GCM default (TL255-eORCA1) - 3 years test MN5	bsc- marenostrum5
t0lp	FAILED				
t0lq	Successful				
t0lr	FAILED				

test id	status	sim run time avg	sim runs	#PROC	SYPD	ASYPD	details	hpc
t0lo	RUNNING	0:33:38	2	1008	21.4	21.29	Weekly test case: GCM default (TL255-eORCA1) - 3 years test MN5	bsc- marenostrum5
t0lp	FAILED	-	-	672	0	0	Weekly test case: AMIP default (TL255) - 2 months test MN5	bsc- marenostrum5
t0lq	Successful	0:03:04	2	672	39.13	38.1	Weekly test case: OMIP default (eORCA1) - 2 months test MN5	bsc- marenostrum5
t0lr	FAILED	-	-	784	0	0	Weekly test case: GCM default (TL255-eORCA1) - 2 months test HPC2020	ecmwf- hpc2020



Autosubmit 4 main features

```
DEFAULT:
# Job experiment ID.
EXPID: "t0lo"
# Default HPC platform name.
HPCARCH: bsc-marenostrum5
CUSTOM_CONFIG:
  PRE:
    - "%PROJDIR%/configs/autosubmit_files/default/settings.yml"
    - "~/as4/predefined_config.yml"
  POST:
    - "~/as4/bsc32_platforms.yml"
EXPERIMENT:
# List of start dates
DATELIST: 19900101
# List of members.
MEMBERS: fc00
# Unit of the chunk size. Can be hour, day, month, or year.
CHUNKSIZEUNIT: month
# Size of each chunk.
CHUNKSIZE: 12
# Number of chunks of the experiment.
NUMCHUNKS: 3
CHUNKINI: ''
# Calendar used for the experiment. Can be standard or noleap.
CALENDAR: standard
CONFIGURATION:
  REDMINE_MONITORING: True
  START_FROM_SCRATCH: True
  INI_VERSION: ece4-trunk
  EXP_SETUP: GCM_default
```



Autosubmit 4 main features

```
DEFAULT:
# Job experiment ID.
EXPID: "t0lo"
# Default HPC platform name.
HPCARCH: bsc-marenostrum5
CUSTOM_CONFIG:
  PRE:
    - "%PROJDIR%/configs/autosubmit_files/default/settings.yml"
    - "~/as4/predefined_config.yml"
  POST:
    - "~/as4/bsc32_platforms.yml"
EXPERIMENT:
# List of start dates
DATELIST: 19900101
# List of members.
MEMBERS: fc00
# Unit of the chunk size. Can be hour, day, month, or year.
CHUNKSIZEUNIT: month
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CONFIGURATION:
  REDMINE_MONITORING: True
  START_FROM_SCRATCH: True
  INI_VERSION: ece4-trunk
  EXP_SETUP: GCM_default
```

```
[eferre1@bscesautosubmit03 ~]$
[eferre1@bscesautosubmit03 ~]$ module load autosubmit/4.1.15-conda
[eferre1@bscesautosubmit03 ~]$ autosubmit expid -min -H bsc-marenostrum5 -b "trunk" -d "Experiment example setup"
-repo "https://earth.bsc.es/gitlab/es/auto-ecearth4" -conf "configs/autosubmit_files/default/bootstrap.yml"
Autosubmit is running with 4.1.15
The new experiment "a9x4" has been registered.
Generating folder structure...
Experiment folder: /esarchive/autosubmit/a9x4
Generating config files...
[WARNING] Yaml file /esarchive/autosubmit/a9x4/proj/git_project/configs/autosubmit_files/default/bootstrap.yml not found
Experiment a9x4 created
[eferre1@bscesautosubmit03 ~]$ autosubmit create a9x4
[WARNING] Yaml file /esarchive/autosubmit/a9x4/proj/git_project/configs/autosubmit_files/default/bootstrap.yml not found
Autosubmit is running with 4.1.15
Preparing .lock file to avoid multiple instances with same expid.
[WARNING] Platform BSC-MARENOSTRUM5 not found in configuration file
Cloning trunk https://earth.bsc.es/gitlab/es/auto-ecearth4 into /esarchive/autosubmit/a9x4/proj
Cloning into
Username for
Password for
cloning the repository process
Job list created successfully
[WARNING] Remember to MODIFY the MODEL config files!
[eferre1@bscesautosubmit03 ~]$ autosubmit run a9x4
```



Autosubmit 4 main features

```
DEFAULT:
# Job experiment ID.
EXPID: "t0lo"
# Default HPC platform name.
HPCARCH: bsc-marenostrum5
CUSTOM_CONFIG:
  PRE:
    - "%PROJDIR%/configs/autosubmit_files/default/settings.yml"
    - "~/as4/predefined_config.yml"
  POST:
    - "~/as4/bsc32_platforms.yml"
EXPERIMENT:
# List of start dates
DATELIST: 19900101
# List of members.
MEMBERS: fc00
# Unit of the chunk size. Can be hour, day, month, or year.
CHUNKSIZEUNIT: month
# Size of each chunk.
CHUNKSIZE: 12
# Number of chunks of the experiment.
NUMCHUNKS: 3
CHUNKINI: ''
# Calendar used for the experiment. Can be standard or noleap.
CALENDAR: standard
CONFIGURATION:
  REDMINE_MONITORING: True
  START_FROM_SCRATCH: True
  INI_VERSION: ece4-trunk
  EXP_SETUP: GCM_default
```

```
[eferre1@bscesautosubmit03 ~]$
[eferre1@bscesautosubmit03 ~]$ module load autosubmit/4.1.15-conda
[eferre1@bscesautosubmit03 ~]$ autosubmit expid -min -H bsc-marenostrum5 -b "trunk" -d "Experiment example setup"
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Autosubmit is running with 4.1.15
The new experiment "a9x4" has been registered.
Generating folder structure...
Experiment folder: /esarchive/autosubmit/a9x4
Generating config files...
[WARNING] Yaml file /esarchive/autosubmit/a9x4/proj/git_project/configs/autosubmit_files/default/bootstrap.yml not found
Experiment a9x4 created
[eferre1@bscesautosubmit03 ~]$ autosubmit create a9x4
[WARNING] Yaml file /esarchive/autosubmit/a9x4/proj/git_project/configs/autosubmit_files/default/bootstrap.yml not found
Autosubmit is running with 4.1.15
Preparing .lock file to avoid multiple instances with same expid.
[WARNING] Platform BSC-MARENOSTRUM5 not found in configuration file
Cloning trunk https://earth.bsc.es/gitlab/es/auto-ecearth4 into /esarchive/autosubmit/a9x4/proj
Cloning into
Username for
Password for
Job list created successfully
[WARNING] Remember to MODIFY the MODEL config files!
[eferre1@bscesautosubmit03 ~]$ autosubmit run a9x4
```

cloning the repository process



and just like that, we are running an experiment



Autosubmit 4 main features

```
CUSTOM_CONFIG:
  PRE:
    - "%PROJDIR%/configs/autosubmit_files/default/settings.yml"
    - "~/as4/predefined_config.yml"
  POST:
    - "~/as4/bsc32_platforms.yml"
```



Autosubmit 4 main features

CUSTOM_CONFIG:

PRE:

- "%PROJDIR%/configs/autosubmit_files/default/settings.yml"
- "~/as4/predefined_config.yml"

POST:

- "~/as4/bsc32_platforms.yml"

```
[eferre1@bscshub03 auto-ecearth4]$ tree
```

```
├── configs
│   ├── autosubmit_files
│   │   └── default
│   │       ├── bootstrap.yml
│   │       └── conf
│   │           ├── expdef.yml
│   │           ├── jobs.yml
│   │           ├── platforms.yml
│   │           └── settings.yml
```



Autosubmit 4 main features

CUSTOM_CONFIG:

PRE:

- "%PROJDIR%/configs/autosubmit_files/default/settings.yml"
- "~/as4/predefined_config.yml"

POST:

- "~/as4/bsc32_platforms.yml"

```
[eferre1@bsceshub03 auto-ecearth4]$ tree ~/as4
```

```
/home/Earth/eferre1/as4
├── bsc32_platforms.yml
├── cns82_platforms.yml
├── ecearth4_repo.yml -> ecearth4_user_config.yml
├── ecearth4_user_config.yml
├── hpc2020_platforms.yml
└── predefined_config.yml
```

```
[eferre1@bsceshub03 auto-ecearth4]$ tree
```

```
├── configs
│   ├── autosubmit_files
│   │   └── default
│   │       ├── bootstrap.yml
│   │       └── conf
│   │           ├── expdef.yml
│   │           ├── jobs.yml
│   │           └── platforms.yml
│   └── settings.yml
```



How Auto-EC-Earth 4 will use Autosubmit features

```
[eferre1@bscshub03 auto-ecearth4]$ tree
.
├── configs
│   ├── autosubmit_files
│   │   └── default
│   │       ├── bootstrap.yml
│   │       ├── conf
│   │       │   ├── expdef.yml
│   │       │   ├── jobs.yml
│   │       │   └── platforms.yml
│   │       └── settings.yml
│   └── ...
└── ...
```

How Auto-EC-Earth 4 will use Autosubmit features

```
[eferre1@bscshub03 auto-ecearth4]$ tree
.
├── configs
│   └── autosubmit_files
│       └── default
│           ├── bootstrap.yml
│           ├── conf
│           │   ├── expdef.yml
│           │   ├── jobs.yml
│           │   └── platforms.yml
│           └── settings.yml
```



```
[eferre1@bscshub03 auto-ecearth4]$ tree
.
├── configs
│   └── autosubmit_files
│       ├── amip
│       │   └── ...
│       ├── ccycle
│       │   └── ...
│       ├── default
│       │   ├── bootstrap.yml
│       │   ├── conf
│       │   │   ├── expdef.yml
│       │   │   ├── jobs.yml
│       │   │   └── platforms.yml
│       │   └── settings.yml
│       ├── gcm
│       │   └── ...
│       └── omip
│           └── ...
```

How Auto-EC-Earth 4 will use Autosubmit features

```
EXPERIMENT:
CONFIGURATION:
  REDMINE_MONITORING: True
  START_FROM_SCRATCH: True
  INI_VERSION: ece4-trunk
  EXP_SETUP: GCM_default
  ECMEAN:
    ACTIVATE: True
    # frequency to run ecmean, set to 1 for technical tests, for scientific value it needs to be at least 2-3
    FREQUENCY: 1
  OASIS:
    DEBUG_MODE: 0
    TIME_STATISTICS: 0
    LOAD_BALANCING: 0
  OIFS:
    RESOLUTION: TL255L91
    PRECISION: DP
  NEMO:
    RESOLUTION: eORCA1L75
  COMPONENTS: [oifs, xios, nemo, rnfm, oasis]
  SAVE_FLAGS:
    ENABLED: [raw_output, saveic, monitor, ecmean, log, restarts, runtime, ece4_scripts]
    DISABLED: []
  SAVEIC:
    ACTIVATE: True
    COMPILE: True
    RUNNING: leg
    FREQUENCY: 1
    OIFS_OUTPUT_FREQ: 1y
  SCRIPTENGINE:
    SE_ENV_VERSION: trunk
  REDMINE:
    DESCRIPTION: "TL255L91-eOrca1 test run at MN5 with monitoring"
  COMPILATION:
    CLEAN: True
```

Auto-EC-Earth 4 <-> Script Engine

```
function configure_upload_script_engine_monitoring() {  
mv -f "${logs_path_relative}/base_config_${startdate}_${member}_OFFLINE_MONITOR" "./base_config_${expid}_upload_monitor.yml"  
  
config="- base.context:  
  model_config:  
    components: ${components}  
  experiment:  
    monitoring:  
      upload_only: true  
      activate: true  
      gitlab_api_key: ${gitlab_api_key}"  
  
echo "${config}"  
}
```

Auto-EC-Earth 4 <-> Script Engine

```
function configure_upload_script_engine_monitoring() {  
mv -f "${logs_path_relative}/base_config_${startdate}_${member}_OFFLINE_MONITOR" "./base_config_${expid}_upload_monitor.yml"  
  
config="- base.context:  
  model_config:  
    components: ${components}  
  experiment:  
    monitoring:  
      upload_only: true  
      activate: true  
      gitlab_api_key: ${gitlab_api_key}"  
  
echo "${config}"  
}  
  
- base.context:  
  model_config:  
    components: ['oifs', 'xios', 'nemo', 'rnfm', 'oasis']  
  experiment:  
    monitoring:  
      upload_only: true  
      activate: true  
      gitlab_api_key: . . . . .
```

Auto-EC-Earth 4 <-> Script Engine

```
function configure_upload_script_engine_monitoring() {  
mv -f "${logs_path_relative}/base_config_${startdate}_${member}_OFFLINE_MONITOR" "./base_config_${expid}_upload_monitor.yml"  
  
config="- base.context:  
  model_config:  
    components: ${components}  
  experiment:  
    monitoring:  
      upload_only: true  
      activate: true  
      gitlab_api_key: ${gitlab_api_key}"  
  
echo "${config}"  
}
```

```
- base.context:  
  model_config:  
    components: ['oifs', 'xios', 'nemo', 'rnfm', 'oasis']  
  experiment:  
    monitoring:  
      upload_only: true  
      activate: true  
      gitlab_api_key: . . . . .
```

```
# running the monitoring upload via the script engine code  
se ${SE_PARAMETERS} "base_config_${EXPID}_upload_monitor.yml" "${EXPID}_${STARTDATE}_${MEMBER}_config_SIM.yml"  
"../platforms/${CURRENT_PLATFORM}-${PLATFORM_COMPILERS}.yml" upload_monitoring.yml scriptlib/monitoring.yml
```

Auto-EC-Earth 4 <-> Script Engine

```
function configure_upload_script_engine_monitoring() {  
mv -f "${logs_path_relative}/base_config_${startdate}_${member}_OFFLINE_MONITOR" "./base_config_${expid}_upload_monitor.yml"  
  
config="- base.context:  
  model_config:  
    components: ${components}  
  experiment:  
    monitoring:  
      upload_only: true  
      activate: true  
      gitlab_api_key: ${gitlab_api_key}  
  
echo "${config}"  
}
```

t0lo: TL255L91-eOrca1 test run at MN5 with monitoring

[Open](#) [Issue created 1 week ago by Eric Ferrer](#)

EC-Earth 4: Monitoring

Experiment status

Experiment ID: t0lo

Experiment Description: TL255L91-eOrca1 test run at MN5 with monitoring

Simulated Years: 3 Current number of simulated years.

Disk usage in GiB: 6.6 Current size of /gpfs/scratch/bsc32/bsc032627/t0lo/19900101/fc00/runtime/output

```
# running  
se ${SE_  
"../platf
```

```
n', 'oasis']
```

```
config_SIM.yml"  
monitoring.yml
```

Future developments

ecearth/scriptengine/tasks/sayni.py

```
1  from scriptengine.tasks.core import Task, timed_runner
2
3  ✓ class Sayni(Task):
4
5      def __init__(self, arguments):
6          Sayni.check_arguments(arguments)
7          super().__init__(arguments)
8
9      @timed_runner
10  ✓ def run(self, context):
11      times = self.getarg("times", context)
12      self.log_info(f"I will say NI! {times} times... get ready...")
13      for _ in range(times):
14          print("NI!")
```

Future developments

ecearth/scriptengine/tasks/sayni.py

```
1  from scriptengine.tasks.core import Task, timed_runner
2
3  ✓ class Sayni(Task):
4
5      def __init__(self, arguments):
6          Sayni.check_arguments(arguments)
7          super().__init__(arguments)
8
9      @timed_runner
10  ✓ def run(self, context):
11      times = self.getarg("times", context)
12      self.log_info(f"I will say NI! {times} times... get ready...")
13      for _ in range(times):
14          print("NI!")
```

sample.yml

```
1  - base.context:
2      planet: Earth
3  - base.echo:
4      msg: "Hello, {{ planet }}!"
5  - ecearth.sayni:
6      times: 3
```

Future developments

ecearth/scriptengine/tasks/sayni.py

```
1  from scriptengine.tasks.core import Task, timed_runner
2
3  class Sayni(Task):
4
5      def __init__(self, arguments):
6          Sayni.check_arguments(arguments)
7          super().__init__(arguments)
8
9      @timed_runner
10     def run(self, context):
11         times = self.getarg("times", context)
12         self.log_info(f"I will say NI! {times} times... get ready...")
13         for _ in range(times):
14             print("NI!")
```

sample.yml

```
1  - base.context:
2      planet: Earth
3  - base.echo:
4      msg: "Hello, {{ planet }}!"
5  - ecearth.sayni:
6      times: 3
```

\$ se sample.yml

2025-06-04 16:21:45 INFO [se.cli] Logging configured and started

2025-06-04 16:21:45 INFO [se.task:base.context <ce7cc69010>] Context update:
Context({'planet': 'Earth'})

2025-06-04 16:21:45 INFO [se.task:base.echo <22f58a4720>] Hello, {{ plane...
Hello, Earth!

2025-06-04 16:21:45 INFO [se.task:ecearth.sayni <0cc01c7e39>] I will say NI! 3
times... get ready...

NI!

NI!

NI!

Take home points

- Autosubmit 4 is a powerful workflow manager, used in multiple models to orchestrate the runs of production experiments.
- From the BSC, we are developing our workflow with the EC-Earth community in mind, trying to make it accessible for everyone, either using Autosubmit or not.
- Script Engine is not a Workflow Manager, just a tool to help organize and run yml (parsed with jinja2) scripts.



**Barcelona
Supercomputing
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Centro Nacional de Supercomputación



Thank you

Eric Ferrer, Breixo Soliño,
Gilbert Montané

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16/10/2025

