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# **autosubmit Documentation**

***Release 3.0***

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## INTRODUCTION

### 1.1 What is Autosubmit ?

Autosubmit is a python-based tool to create, manage and monitor experiments by using Computing Clusters, HPC's and Supercomputers remotely via ssh. It has support for experiments running in more than one HPC and for different workflow configurations.

Autosubmit is currently used at IC3 to run EC-Earth and NEMO models and at Barcelona Supercomputing Centre (BSC) to run NMMB air quality model.

Autosubmit has been used to manage models running at supercomputers in IC3, BSC, ECMWF, EPCC, PDC and OLCF.

Autosubmit 3.0 version is now available via *PyPi* package under the terms of *GNU General Public License*.

### 1.2 Why is Autosubmit needed ?

Autosubmit is the only existing tool that satisfies the following requirements from the weather and climate community:

- *Automatisation*: Job submission to machines and dependencies between jobs are managed by Autosubmit. No user intervention is needed.
- *Data provenance*: Assigns unique identifiers for each experiment and stores information about model version, experiment configuration and computing facilities used in the whole process.
- *Failure tolerance*: Automatic retrials and ability to rerun chunks in case of corrupted or missing data.
- *Resource management*: Autosubmit manages supercomputer particularities, allowing users to run their experiments in the available machine without having to adapt the code. Autosubmit also allows to submit tasks from the same experiment to different platforms.

### 1.3 How does Autosubmit work ?

You can find help about how to use autosubmit and a list of available commands, just executing:

```
autosubmit -h
```

Execute `autosubmit <command> -h` for detailed help for each command:

```
autosubmit expid -h
```

### 1.3.1 Experiment creation

To create a new experiment, run the command:

```
autosubmit expid -H HPCName -d Description
```

*HPCName* is the name of the main HPC platform for the experiment: it will be the default platform for the tasks. *Description* is a brief experiment description.

This command assigns a unique four character identifier (xxxx, names starting from a letter, the other three characters) to the experiment and creates a new folder in experiments repository with structure shown in Figure 1.1.

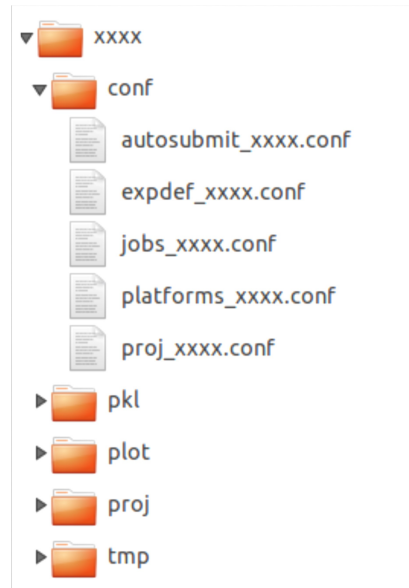


Figure 1.1: Example of an experiment directory tree.

### 1.3.2 Experiment configuration

To configure the experiment, edit `expdef_xxxx.conf`, `jobs_xxxx.conf` and `platforms_xxxx.conf` in the `conf` folder of the experiment (see contents in Figure 1.2).

After that, you are expected to run the command:

```
autosubmit create xxxx
```

This command creates the experiment project in the `proj` folder. The experiment project contains the scripts specified in `jobs_xxxx.conf` and a copy of model source code and data specified in `expdef_xxxx.conf`.

### 1.3.3 Experiment run

To run the experiment, just execute the command:

```
autosubmit run xxxx
```

Autosubmit will start submitting jobs to the relevant platforms (both HPC and supporting computers) by using the scripts specified in `jobs_xxxx.conf`. Autosubmit will substitute variables present on scripts where handlers ap-

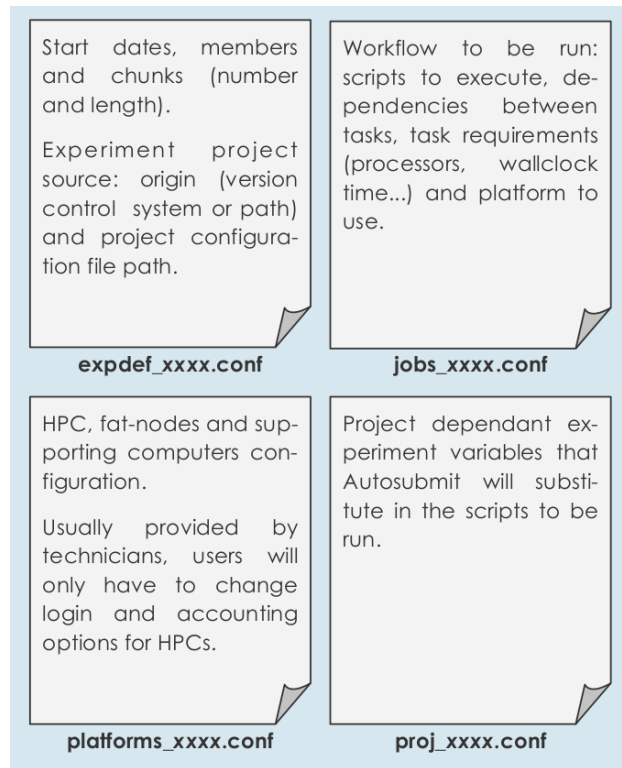


Figure 1.2: Configuration files content

pear in `%variable_name%` format. Autosubmit provides variables for *current chunk*, *start date*, *member*, *computer configuration* and more, and also will replace variables form `proj_xxxx.conf`.

To monitor the status of the experiment, the command:

```
autosubmit monitor xxxx
```

is available. This will plot the workflow of the experiment and the current status.

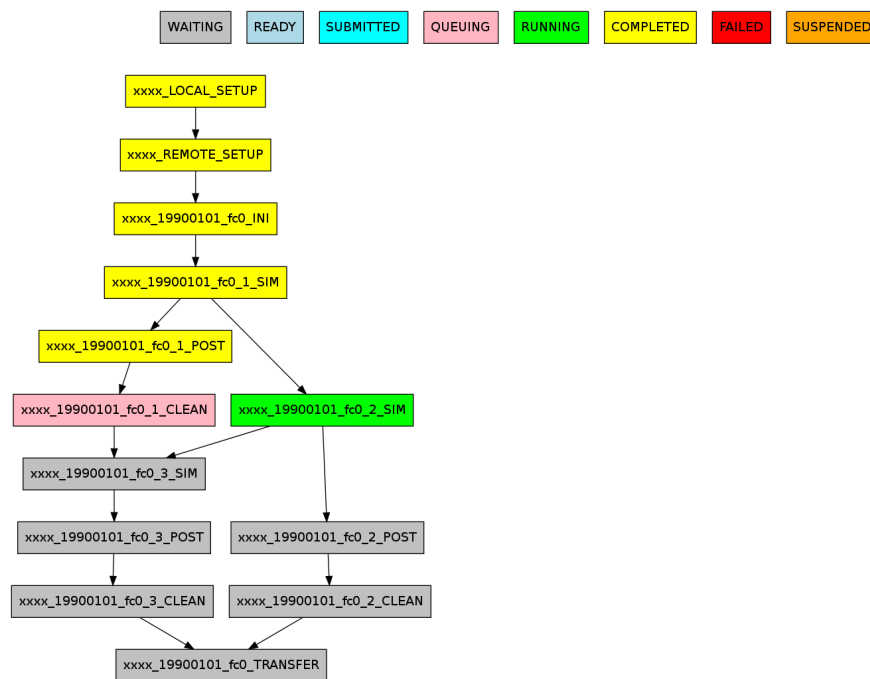


Figure 1.3: Example of monitoring plot for EC-Earth run with Autosubmit for 1 start date, 1 member and 3 chunks.

## 2.1 Quick start guide

### 2.1.1 First Step: Experiment creation

To create a new experiment, run the command:

```
autosubmit expid -H HPCName -d Description
```

*HPCName* is the name of the main HPC platform for the experiment: it will be the default platform for the tasks. *Description* is a brief experiment description.

This command assigns a unique four character identifier (xxxx, names starting from a letter, the other three characters) to the experiment and creates a new folder in experiments repository.

Examples:

```
autosubmit expid --HPC ithaca --description "experiment is about..."
```

**Caution:** The *HPCName*, e.g. *ithaca*, must be defined in the platforms configuration. See next section *Second Step: Experiment configuration*.

```
autosubmit expid --copy a000 --HPC ithaca -d "experiment is about..."
```

**Warning:** You can only copy experiments created with Autosubmit 3.0 or above.

### 2.1.2 Second Step: Experiment configuration

To configure the experiment, edit `expdef_cxxx.conf`, `jobs_cxxx.conf` and `platforms_cxxx.conf` in the `conf` folder of the experiment.

*expdef\_cxxx.conf* contains:

- Start dates, members and chunks (number and length).
- Experiment project source: origin (version control system or path)
- Project configuration file path.

*jobs\_cxxx.conf* contains the workflow to be run:

- Scripts to execute.
- Dependencies between tasks.

- Task requirements (processors, wallclock time...).
- Platform to use.

***platforms\_cxxx.conf* contains:**

- HPC, fat-nodes and supporting computers configuration.

---

**Note:** *platforms\_cxxx.conf* is usually provided by technicians, users will only have to change login and accounting options for HPCs.

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You may want to configure Autosubmit parameters for the experiment. Just edit `autosubmit_cxxx.conf`.

***autosubmit\_cxxx.conf* contains:**

- Maximum number of jobs to be waiting in the HPC queue.
- Maximum number of jobs to be running at the same time at the HPC.
- Time (seconds) between connections to the HPC queue scheduler to poll already submitted jobs status.
- Number of retrials if a job fails.

Examples:

```
vi <experiments_directory>/cxxx/conf/expdef_cxxx.conf
```

**[DEFAULT]**

```
# Experiment identifier
# No need to change
EXPID = cxxx
# HPC name.
# No need to change
HPCARCH = ithaca
```

**[experiment]**

```
# Supply the list of start dates. Available formats: YYYYMMDD YYYYMMDDhh YYYYMMDDhhmm
# Also you can use an abbreviated syntax for multiple dates with common parts:
# 200001[01 15] <=> 20000101 20000115
# DATELIST = 19600101 19650101 19700101
# DATELIST = 1960[0101 0201 0301]
DATELIST = 19900101
# Supply the list of members. LIST = fc0 fc1 fc2 fc3 fc4
MEMBERS = fc0
# Chunk size unit. STRING = hour, day, month, year
CHUNKSIZEUNIT = month
# Chunk size. NUMERIC = 4, 6, 12
CHUNKSIZE = 1
# Total number of chunks in experiment. NUMERIC = 30, 15, 10
NUMCHUNKS = 2
# Calendar used. LIST: standard, noleap
CALENDAR = standard
```

**[rerun]**

```
# Is a rerun or not? [Default: Do set FALSE]. BOOLEAN = TRUE, FALSE
RERUN = FALSE
# If RERUN = TRUE then supply the list of chunks to rerun
# LIST = "[ 19601101 [ fc0 [1 2 3 4] fc1 [1] ] 19651101 [ fc0 [16-30] ] ]"
CHUNKLIST =
```

**[project]**

```

# Select project type. STRING = git, svn, local, none
# If PROJECT_TYPE is set to none, Autosubmit self-contained dummy templates will be used
PROJECT_TYPE = git
# Destination folder name for project. type = STRING, default = leave empty,
PROJECT_DESTINATION = model

# If PROJECT_TYPE is not git, no need to change
[git]
# Repository URL STRING = 'https://github.com/torvalds/linux.git'
PROJECT_ORIGIN = https://gitlab.cfu.local/cfu/auto-ecearth3.git
# Select branch or tag, STRING, default = 'master',
# help = {'master' (default), 'develop', 'v3.1b', ...}
PROJECT_BRANCH = develop
# type = STRING, default = leave empty, help = if model branch is a TAG leave empty
PROJECT_COMMIT =

# If PROJECT_TYPE is not svn, no need to change
[svn]
# type = STRING, help = 'https://svn.ec-earth.org/ecearth3'
PROJECT_URL =
# Select revision number. NUMERIC = 1778
PROJECT_REVISION =

# If PROJECT_TYPE is not local, no need to change
[local]
# type = STRING, help = /foo/bar/ecearth
PROJECT_PATH =

# If PROJECT_TYPE is none, no need to change
[project_files]
# Where is PROJECT CONFIGURATION file location relative to project root path
FILE_PROJECT_CONF = templates/ecearth3/ecearth3.conf

vi <experiments_directory>/cxxx/conf/jobs_cxxx.conf

# Example job with all options specified

## Job name
# [JOBNAME]
## Script to execute. If not specified, job will be omitted from workflow.
## Path relative to the project directory
# FILE =
## Platform to execute the job. If not specified, defaults to HPCARCH in expedf file.
## LOCAL is always defined and refers to current machine
# PLATFORM =
## Queue to add the job to. If not specified, uses PLATFORM default.
# QUEUE =
## Defines dependencies from job as a list of parents jobs separated by spaces.
## Dependencies to jobs in previous chunk, member o startdate, use -(DISTANCE)
# DEPENDENCIES = INI SIM-1 CLEAN-2
## Define if jobs runs once, once per stardate, once per member or once per chunk.
## Options: once, date, member, chunk.
## If not specified, defaults to once
# RUNNING = once
## Specifies that job has only to be run after X dates, members or chunk.
## A job will always be created for the last
## If not specified, defaults to once
# FREQUENCY = 3

```

```
## Defines if job is only to be executed in reruns. If not specified, defaults to false.
# RERUN_ONLY = False
## Defines jobs needed to be rerun if this job is going to be rerun
# RERUN_DEPENDENCIES = RERUN INI LOCAL_SETUP REMOTE_SETUP TRANSFER
## Wallclock to be submitted to the HPC queue in format HH:MM
# WALLCLOCK = 00:05
## Processors number to be submitted to the HPC. If not specified, defaults to 1.
# PROCESSORS = 1
## Threads number to be submitted to the HPC. If not specified, defaults to 1.
# THREADS = 1
## Tasks number to be submitted to the HPC. If not specified, defaults to 1.
# TASKS = 1
```

**[LOCAL\_SETUP]**

```
FILE = templates/common/common.localsetup
PLATFORM = LOCAL
```

**[REMOTE\_SETUP]**

```
FILE = templates/common/common.remotesetup
DEPENDENCIES = LOCAL_SETUP
WALLCLOCK = 03:00
```

**[INI]**

```
FILE = templates/ecearth3/ecearth3.ini
DEPENDENCIES = REMOTE_SETUP
RUNNING = member
WALLCLOCK = 01:00
```

**[SIM]**

```
FILE = templates/ecearth3/ecearth3.sim
DEPENDENCIES = INI SIM-1 CLEAN-2
RUNNING = chunk
WALLCLOCK = 04:00
PROCESSORS = 1616
THREADS = 1
TASKS = 1
```

**[POST]**

```
FILE = templates/ecearth3/ecearth3.post
DEPENDENCIES = SIM
RUNNING = chunk
WALLCLOCK = 06:00
```

**[CLEAN]**

```
FILE = templates/ecearth3/ecearth3.clean
DEPENDENCIES = POST
RUNNING = chunk
WALLCLOCK = 01:00
```

**[TRANSFER]**

```
FILE = templates/common/common.localtrans
PLATFORM = LOCAL
DEPENDENCIES = CLEAN
RUNNING = member
```

```
vi <experiments_directory>/cxxx/conf/platforms_cxxx.conf
```

```

# Example queue with all options specified

## Platform name
# [PLAFORM]
## Queue type. Options: PBS, SGE, PS, LSF, ecaccess, SLURM
# TYPE =
## Version of queue manager to use. Needed only in PBS (options: 10, 11, 12)
## and ecaccess (options: pbs, loadleveler)
# VERSION =
## Hostname of the HPC
# HOST =
## Project for the machine scheduler
# PROJECT =
## Budget account for the machine scheduler. If omitted, takes the value defined in PROJECT
# BUDGET =
## Option to add project name to host. This is required for some HPCs
# ADD_PROJECT_TO_HOST = False
## User for the machine scheduler
# USER =
## Path to the scratch directory for the machine
# SCRATCH_DIR = /scratch
## If true, autosubmit test command can use this queue as a main queue. Defaults to false
# TEST_SUITE = False
## If given, autosubmit will add jobs to the given queue
# QUEUE =
## If specified, autosubmit will run jobs with only one processor in the specified platform.
# SERIAL_PLATFORM = SERIAL_PLATFORM_NAME
## If specified, autosubmit will run jobs with only one processor in the specified queue.
## Autosubmit will ignore this configuration if SERIAL_PLATFORM is provided
# SERIAL_QUEUE = SERIAL_QUEUE_NAME

[ithaca]
# Queue type. Options: ps, SGE, LSF, SLURM, PBS, eceaccess
TYPE = SGE
HOST = ithaca
PROJECT = cfu
ADD_PROJECT_TO_HOST = true
USER = dmanubens
SCRATCH_DIR = /scratch/cfu
TEST_SUITE = True

vi <experiments_directory>/cxxx/conf/autosubmit_cxxx.conf

[config]
# Experiment identifier
# No need to change
EXPID = cxxx
# No need to change.
# Autosubmit version identifier
AUTOSUBMIT_VERSION = 3.0.0rc1
# Maximum number of jobs to be waiting in the HPC queue
# Default = 3
MAXWAITINGJOBS = 3
# Maximum number of jobs to be running at the same time at the HPC
# Default = 6
TOTALJOBS = 6
# Time (seconds) between connections to the HPC queue scheduler to poll already
# submitted jobs status

```

```
# Default = 10
SAFETYSLEEPTIME = 10
# Number of retrials if a job fails
# Default = 4
RETRIALS = 4
```

Then, Autosubmit *create* command uses the `expdef_cxxx.conf` and generates the experiment:

```
autosubmit create cxxx
```

`cxxx` is the name of the experiment.

In the process of creating the new experiment a plot has been created.

It can be found in `<experiments_directory>/cxxx/plot/`

## 2.1.3 Third Step: Experiment run

After filling the experiment configuration and create, user can go into `proj` which has a copy of the model.

A short reference on how to prepare the experiment project is detailed in the following section of this documentation:

### *Developing a project*

The experiment project contains the scripts specified in `jobs_xxxx.conf` and a copy of model source code and data specified in `expdef_xxxx.conf`.

To configure experiment project parameters for the experiment, edit `proj_cxxx.conf`.

***proj\_cxxx.conf* contains:**

- The project dependant experiment variables that Autosubmit will substitute in the scripts to be run.

Example:

```
vi <experiments_directory>/cxxx/conf/proj_cxxx.conf
```

```
[common]
# No need to change.
MODEL = ecearth
# No need to change.
VERSION = v3.1
# No need to change.
TEMPLATE_NAME = ecearth3
# Select the model output control class. STRING = Option
# listed under the section : http://ic3.cat/wikicfu/index.php/Models#Outclass.
OUTCLASS = specs
# After transferring output at /cfunas/exp remove a copy available at permanent storage of HPC
# [Default: Do set "TRUE"]. BOOLEAN = TRUE, FALSE
MODEL_output_remove = TRUE
# Activate cmorization [Default: leave empty]. BOOLEAN = TRUE, FALSE
CMORIZATION = TRUE
# Essential if cmorization is activated.
# STRING = (http://www.specs-fp7.eu/wiki/images/1/1c/SPECS\_standard\_output.pdf)
CMORFAMILY =
# Supply the name of the experiment associated (if there is any) otherwise leave it empty.
# STRING (with space) = seasonal rlp1, seaiceinit r?p?
ASSOCIATED_EXPERIMENT =
# Essential if cmorization is activated (Forcing). STRING = Nat,Ant (Nat and Ant is a single option)
FORCING =
# Essential if cmorization is activated (Initialization description). STRING = N/A
```

```

INIT_DESCR =
# Essential if cmorization is activated (Physics description). STRING = N/A
PHYS_DESCR =
# Essential if cmorization is activated (Associated model). STRING = N/A
ASSOC_MODEL =

[grid]
# AGCM grid resolution, horizontal (truncation T) and vertical (levels L).
# STRING = T159L62, T255L62, T255L91, T511L91, T799L62 (IFS)
IFS_resolution = T511L91
# OGCM grid resolution. STRING = ORCA1L46, ORCA1L75, ORCA025L46, ORCA025L75 (NEMO)
NEMO_resolution = ORCA025L75

[oasis]
# Coupler (OASIS) options.
OASIS3 = yes
# Number of pseduo-parallel cores for coupler [Default: Do set "7"]. NUMERIC = 1, 7, 10
OASIS_nproc = 7
# Handling the creation of coupling fields dynamically [Default: Do set "TRUE"].
# BOOLEAN = TRUE, FALSE
OASIS_flds = TRUE

[ifs]
# Atmospheric initial conditions ready to be used.
# STRING = ID found here : http://ic3.cat/wikicfu/index.php/Initial\_Conditions/Atmospheric
ATM_ini =
# A different IC member per EXPID member ["PERT"] or which common IC member
# for all EXPID members ["fc0" / "fc1"]. String = PERT/fc0/fc1...
ATM_ini_member =
# Set timestep (in sec) w.r.t resolution.
# NUMERIC = 3600 (T159), 2700 (T255), 900 (T511), 720 (T799)
IFS_timestep = 900
# Number of parallel cores for AGCM component. NUMERIC = 28, 100
IFS_nproc = 640
# Coupling frequency (in hours) [Default: Do set "3"]. NUMERIC = 3, 6
RUN_coupFreq = 3
# Post-procassing frequency (in hours) [Default: Do set "6"]. NUMERIC = 3, 6
NFRP = 6
# [Default: Do set "TRUE"]. BOOLEAN = TRUE, FALSE
LCMIP5 = TRUE
# Choose RCP value [Default: Do set "2"]. NUMERIC = 0, 1=3-PD, 2=4.5, 3=6, 4=8.5
NRCP = 0
# [Default: Do set "TRUE"]. BOOLEAN = TRUE, FALSE
LHVOLCA = TRUE
# [Default: Do set "0"]. NUMERIC = 1850, 2005
NFIYR = 0
# Save daily output or not [Default: Do set "FALSE"]. BOOLEAN = TRUE, FALSE
SAVEDDA = FALSE
# Save reduced daily output or not [Default: Do set "FALSE"]. BOOLEAN = TRUE, FALSE
ATM_REDUCED_OUTPUT = FALSE
# Store grib codes from SH files [User need to refer defined ppt* files for the experiment]
ATM_SH_CODES =
# Store levels against "ATM_SH_CODES" e.g: level1,level2,level3, ...
ATM_SH_LEVELS =
# Store grib codes from GG files [User need to refer defined ppt* files for the experiment]
ATM_GG_CODES =
# Store levels against "ATM_GG_CODES" (133.128, 246.128, 247.128, 248.128)
# e.g: level1,level2,level3, ...

```

```
ATM_GG_LEVELS =
# SPPT stochastic physics active or not [Default: set "FALSE"]. BOOLEAN = TRUE, FALSE
LSPPT = FALSE
# Write the perturbation patterns for SPPT or not [Default: set "FALSE"].
# BOOLEAN = TRUE, FALSE
LWRITE_ARP =
# Number of scales for SPPT [Default: set 3]. NUMERIC = 1, 2, 3
NS_SPPT =
# Standard deviations of each scale [Default: set 0.50,0.25,0.125]
# NUMERIC values separated by ,
SDEV_SPPT =
# Decorrelation times (in seconds) for each scale [Default: set 2.16E4,2.592E5,2.592E6]
# NUMERIC values separated by ,
TAU_SPPT =
# Decorrelation lengths (in meters) for each scale [Default: set 500.E3,1000.E3,2000.E3]
# NUMERIC values separated by ,
XLCOR_SPPT =
# Clipping ratio (number of standard deviations) for SPPT [Default: set 2] NUMERIC
XCLIP_SPPT =
# Stratospheric tapering in SPPT [Default: set "TRUE"]. BOOLEAN = TRUE, FALSE
LTAPER_SPPT =
# Top of stratospheric tapering layer in Pa [Default: set to 50.E2] NUMERIC
PTAPER_TOP =
# Bottom of stratospheric tapering layer in Pa [Default: set to 100.E2] NUMERIC
PTAPER_BOT =
## ATMOSPHERIC NUDGING PARAMETERS ##
# Atmospheric nudging towards reinterpolated ERA-Interim data. BOOLEAN = TRUE, FALSE
ATM_NUDGING = FALSE
# Atmospheric nudging reference data experiment name. [T255L91: b0ir]
ATM_refnud =
# Nudge vorticity. BOOLEAN = TRUE, FALSE
NUD_VO =
# Nudge divergence. BOOLEAN = TRUE, FALSE
NUD_DI =
# Nudge temperature. BOOLEAN = TRUE, FALSE
NUD_TE =
# Nudge specific humidity. BOOLEAN = TRUE, FALSE
NUD_Q =
# Nudge liquid water content. BOOLEAN = TRUE, FALSE
NUD_QL =
# Nudge ice water content. BOOLEAN = TRUE, FALSE
NUD_QI =
# Nudge cloud fraction. BOOLEAN = TRUE, FALSE
NUD_QC =
# Nudge log of surface pressure. BOOLEAN = TRUE, FALSE
NUD_LP =
# Relaxation coefficient for vorticity. NUMERIC in ]0,inf[;
# 1 means half way between model value and ref value
ALPH_VO =
# Relaxation coefficient for divergence. NUMERIC in ]0,inf[;
# 1 means half way between model value and ref value
ALPH_DI =
# Relaxation coefficient for temperature. NUMERIC in ]0,inf[;
# 1 means half way between model value and ref value
ALPH_TE =
# Relaxation coefficient for specific humidity. NUMERIC in ]0,inf[;
# 1 means half way between model value and ref value
ALPH_Q =
```

```
# Relaxation coefficient for log surface pressure. NUMERIC in ]0,inf[;
# 1 means half way between model value and ref value
ALPH_LP =
# Nudging area Northern limit [Default: Do set "90"]
NUD_NLAT =
# Nudging area Southern limit [Default: Do set "-90"]
NUD_SLAT =
# Nudging area Western limit NUMERIC in [0,360] [Default: Do set "0"]
NUD_WLON =
# Nudging area Eastern limit NUMERIC in [0,360] [Default: Do set "360"; E<W will span Greenwich]
NUD_ELON =
# Nudging vertical levels : lower level [Default: Do set "1"]
NUD_VMIN =
# Nudging vertical levels : upper level [Default: Do set to number of vertical levels]
NUD_VMAX =
```

### [nemo]

```
# Ocean initial conditions ready to be used. [Default: leave empty].
# STRING = ID found here : http://ic3.cat/wikicfu/index.php/Initial\_Conditions/Oceanic
OCEAN_ini =
# A different IC member per EXPID member ["PERT"] or which common IC member
# for all EXPID members ["fc0" / "fc1"]. String = PERT/fc0/fc1...
OCEAN_ini_member =
# Set timestep (in sec) w.r.t resolution. NUMERIC = 3600 (ORCA1), 1200 (ORCA025)
NEMO_timestep = 1200
# Number of parallel cores for OGCM component. NUMERIC = 16, 24, 36
NEMO_nproc = 960
# Ocean Advection Scheme [Default: Do set "tvd"]. STRING = tvd, cen2
ADVSCH = cen2
# Nudging activation. BOOLEAN = TRUE, FALSE
OCEAN_NUDGING = FALSE
# Toward which data to nudge; essential if "OCEAN_NUDGING" is TRUE.
# STRING = fa9p, s4, glorys2v1
OCEAN_NUDDATA = FALSE
# Rebuild and store restarts to HSM for an immediate prediction experiment.
# BOOLEAN = TRUE, FALSE
OCEAN_STORERST = FALSE
```

### [ice]

```
# Sea-Ice Model [Default: Do set "LIM2"]. STRING = LIM2, LIM3
ICE = LIM3
# Sea-ice initial conditions ready to be used. [Default: leave empty].
# STRING = ID found here : http://ic3.cat/wikicfu/index.php/Initial\_Conditions/Sea-Ice
ICE_ini =
# A different IC member per EXPID member ["PERT"] or which common IC member
# for all EXPID members ["fc0" / "fc1"]. String = PERT/fc0/fc1...
ICE_ini_member =
# Set timestep (in sec) w.r.t resolution. NUMERIC = 3600 (ORCA1), 1200 (ORCA025)
LIM_timestep = 1200
```

### [pisces]

```
# Activate PISCES (TRUE) or not (FALSE) [Default: leave empty]
PISCES = FALSE
# PISCES initial conditions ready to be used. [Default: leave empty].
# STRING = ID found here : http://ic3.cat/wikicfu/index.php/Initial\_Conditions/Biogeochemistry
PISCES_ini =
# Set timestep (in sec) w.r.t resolution. NUMERIC = 3600 (ORCA1), 3600 (ORCA025)
PISCES_timestep = 3600
```

Finally, you can launch Autosubmit *run* in background and with `nohup` (continue running although the user who launched the process logs out).

```
nohup autosubmit run cxxx &
```

### 2.1.4 Fourth Step: Experiment monitor

The following procedure could be adopted to generate the plots for visualizing the status of the experiment at any instance. With this command we can generate new plots to check which is the status of the experiment. Different job status are represented with different colors.

```
autosubmit monitor cxxx
```

The location where user can find the generated plots with date and timestamp can be found below:

```
<experiments_directory>/cxxx/plot/cxxx_<date>_<time>.pdf
```

## INSTALLATION

### 3.1 How to install

The Autosubmit code is maintained in *PyPi*, the main source for python packages.

- Pre-requisties: These packages (bash, python2, sqlite3, git-scm > 1.8.2, subversion) must be available at local host machine. These packages (argparse, dateutil, pyparsing, numpy, pydotplus, matplotlib, paramiko) must be available for python runtime.

---

**Important:** The host machine has to be able to access HPC's/Clusters via password-less ssh.

---

To install autosubmit just execute:

```
pip install autosubmit
```

or download, unpack and:

```
python setup.py install
```

---

**Hint:** To check if autosubmit has been installed run `autosubmit -v`. This command will print autosubmit's current version

---

---

**Hint:** To read autosubmit's readme file, run `autosubmit readme`

---

---

**Hint:** To see the changelog, use `autosubmit changelog`

---

### 3.2 How to configure

After installation, you have to configure database and path for Autosubmit. It can be done at host, user or local level (by default at host level). If it does not exist, create a repository for experiments: Say for example `/cfu/autosubmit`

Then follow the configre instructions after executing:

```
autosubmit configure
```

and introduce path to experiment storage and database. Folders must exit.

For installing the database for Autosubmit on the configured folder, when no database is created on the given path, execute:

```
autosubmit install
```

**Danger:** Be careful ! autosubmit install will create a blank database.

Now you are ready to use Autosubmit !

## 4.1 Command list

<b>-expid</b>	Create a new experiment
<b>-create</b>	Create specified experiment workflow
<b>-check</b>	Check configuration for specified experiment
<b>-run</b>	Run specified experiment
<b>-test</b>	Test experiment
<b>-monitor</b>	Plot specified experiment
<b>-stats</b>	Plot statistics for specified experiment
<b>-setstatus</b>	Sets job status for an experiment
<b>-recovery</b>	Recover specified experiment
<b>-clean</b>	Clean specified experiment
<b>-refresh</b>	Refresh project directory for an experiment
<b>-delete</b>	Delete specified experiment
<b>-configure</b>	Configure database and path for autosubmit
<b>-install</b>	Install database for Autosubmit on the configured folder

-refresh Refresh project directory for an experiment -archive Clean, compress and remove from the experiments' folder  
a finalized experiment -unarchive Restores an archived experiment

## 4.2 How to create an experiment

To create a new experiment, just run the command:

```
autosubmit expid -H HPCName -d Description
```

*HPCName* is the name of the main HPC platform for the experiment: it will be the default platform for the tasks.  
*Description* is a brief experiment description.

Options:

```
usage: autosubmit expid [-h] [-y COPY | -dm] -H HPC -d DESCRIPTION
```

```
-h, --help                show this help message and exit
-y COPY, --copy COPY      makes a copy of the specified experiment
-dm, --dummy              creates a new experiment with default values, usually for testing
-H HPC, --HPC HPC         specifies the HPC to use for the experiment
-d DESCRIPTION, --description DESCRIPTION
                           sets a description for the experiment to store in the database.
```

Example:

```
autosubmit expid --HPC ithaca --description "experiment is about..."
```

## 4.3 How to create a copy of an experiment

This option makes a copy of an existing experiment. It registers a new unique identifier and copies all configuration files in the new experiment folder:

```
autosubmit expid -H HPCName -y COPY -d Description
```

*HPCName* is the name of the main HPC platform for the experiment: it will be the default platform for the tasks. *COPY* is the experiment identifier to copy from. *Description* is a brief experiment description.

Example:

```
autosubmit expid -H ithaca -y cxxx -d "experiment is about..."
```

**Warning:** You can only copy experiments created with Autosubmit 3.0 or above.

## 4.4 How to create a dummy experiment

This command creates a new experiment with default values, useful for testing:

```
autosubmit expid -H HPCName -dm -d Description
```

*HPCName* is the name of the main HPC platform for the experiment: it will be the default platform for the tasks. *Description* is a brief experiment description.

Example:

```
autosubmit expid -H ithaca -dm "experiment is about..."
```

## 4.5 How to configure the experiment

Edit `expdef_cxxx.conf`, `jobs_cxxx.conf` and `platforms_cxxx.conf` in the `conf` folder of the experiment.

*expdef\_cxxx.conf* contains:

- Start dates, members and chunks (number and length).
- Experiment project source: origin (version control system or path)

- Project configuration file path.

***jobs\_cxxx.conf* contains the workflow to be run:**

- Scripts to execute.
- Dependencies between tasks.
- Task requirements (processors, wallclock time...).
- Platform to use.

***platforms\_cxxx.conf* contains:**

- HPC, fat-nodes and supporting computers configuration.

---

**Note:** *platforms\_cxxx.conf* is usually provided by technicians, users will only have to change login and accounting options for HPCs.

---

You may want to configure Autosubmit parameters for the experiment. Just edit `autosubmit_cxxx.conf`.

***autosubmit\_cxxx.conf* contains:**

- Maximum number of jobs to be running at the same time at the HPC.
- Time (seconds) between connections to the HPC queue scheduler to poll already submitted jobs status.
- Number of retrials if a job fails.

Then, Autosubmit *create* command uses the `expdef_cxxx.conf` and generates the experiment: After editing the files you can proceed to the experiment workflow creation. Experiment workflow, which contains all the jobs and its dependencies, will be saved as a *pkl* file:

```
autosubmit create EXPID
```

*EXPID* is the experiment identifier.

Options:

```
usage: autosubmit create [-h] [-np] expid

expid          experiment identifier

-h, --help     show this help message and exit
-np, --noplots omit plot
```

Example:

```
autosubmit create cxxx
```

More info on pickle can be found at <http://docs.python.org/library/pickle.html>

## 4.6 How to check the experiment configuration

To check the configuration of the experiment, use the command:

```
autosubmit check EXPID
```

*EXPID* is the experiment identifier.

It checks experiment configuration and warns about any detected error or inconsistency.

Options:

```
usage: autosubmit check [-h] expid
```

```
    expid                experiment identifier
```

```
    -h, --help            show this help message and exit
```

Example:

```
autosubmit check cxxx
```

## 4.7 How to run the experiment

Launch Autosubmit with the command:

```
autosubmit run EXPID
```

*EXPID* is the experiment identifier.

Options:

```
usage: autosubmit run [-h] expid
```

```
    expid                experiment identifier
```

```
    -h, --help            show this help message and exit
```

Example:

```
autosubmit run cxxx
```

---

**Hint:** It is recommended to launch it in background and with `nohup` (continue running although the user who launched the process logs out).

---

Example:

```
nohup autosubmit run cxxx &
```

---

**Important:** Before launching Autosubmit check password-less ssh is feasible (*HPCName* is the hostname):

```
ssh HPCName
```

---

More info on password-less ssh can be found at: [http://www.linuxproblem.org/art\\_9.html](http://www.linuxproblem.org/art_9.html)

**Caution:** After launching Autosubmit, one must be aware of login expiry limit and policy (if applicable for any HPC) and renew the login access accordingly (by using token/key etc) before expiry.

## 4.8 How to test the experiment

This method is to conduct a test for a given experiment. It creates a new experiment for a given experiment with a given number of chunks with a random start date and a random member to be run on a random HPC.

To test the experiment, use the command:

```
autosubmit test CHUNKS EXPID
```

*EXPID* is the experiment identifier. *CHUNKS* is the number of chunks to run in the test.

Options:

```
usage: autosubmit test [-h] -c CHUNKS [-m MEMBER] [-s STARDATE] [-H HPC] [-b BRANCH] expid
expid                                experiment identifier

-h, --help                          show this help message and exit
-c CHUNKS, --chunks CHUNKS          chunks to run
-m MEMBER, --member MEMBER          member to run
-s STARDATE, --stardate STARDATE    stardate to run
-H HPC, --HPC HPC                  HPC to run experiment on it
-b BRANCH, --branch BRANCH          branch from git to run (or revision from subversion)
```

Example:

```
autosubmit test -c 1 -s 19801101 -m fc0 -H ithaca -b develop cxxx
```

## 4.9 How to monitor the experiment

To monitor the status of the experiment, use the command:

```
autosubmit monitor EXPID
```

*EXPID* is the experiment identifier.

Options:

```
usage: autosubmit monitor [-h] [-o {pdf,png,ps,svg}] expid
expid                                experiment identifier

-h, --help                          show this help message and exit
-o {pdf,png,ps,svg}, --output {pdf,png,ps,svg}
                                     type of output for generated plot
```

Example:

```
autosubmit monitor cxxx
```

The location where user can find the generated plots with date and timestamp can be found below:

```
<experiments_directory>/cxxx/plot/cxxx_<date>_<time>.pdf
```

---

**Hint:** Very large plots may be a problem for some pdf and image viewers. If you are having trouble with your usual monitoring tool, try using svg output and opening it with Google Chrome with the SVG Navigator extension installed.

---

## 4.10 How to monitor job statistics

The following command could be adopted to generate the plots for visualizing the jobs statistics of the experiment at any instance:

```
autosubmit stats EXPID
```

*EXPID* is the experiment identifier.

Options:

```
usage: autosubmit stats [-h] [-o {pdf,png,ps,svg}] expid
```

expid	experiment identifier
-h, --help	show this help message and exit
-o {pdf,png,ps,svg}, --output {pdf,png,ps,svg}	type of output for generated plot

Example:

```
autosubmit stats cxxx
```

The location where user can find the generated plots with date and timestamp can be found below:

```
<experiments_directory>/cxxx/plot/cxxx_statistics_<date>_<time>.pdf
```

## 4.11 How to stop the experiment

You can stop Autosubmit by sending a signal to the process. To get the process identifier (PID) you can use the `ps` command on a shell interpreter/terminal.

```
ps -ef | grep autosubmit
dmanubens  22835      1   1 May04 ?        00:45:35 autosubmit run cxxxy
dmanubens  25783      1   1 May04 ?        00:42:25 autosubmit run cxxx
```

To send a signal to a process you can use `kill` also on a terminal.

To stop immediately experiment `cxxx`:

```
kill -9 22835
```

---

**Important:** In case you want to restart the experiment, you must follow the *[How to restart the experiment](#)* procedure, explained below, in order to properly resynchronize all completed jobs.

---

## 4.12 How to restart the experiment

This procedure allows you to restart an experiment.

You must execute:

```
autosubmit recovery EXPID
```

*EXPID* is the experiment identifier.

Options:

```
usage: autosubmit recovery [-h] [-all] [-s] expid

expid            experiment identifier

-h, --help      show this help message and exit
-all           Get all completed files to synchronize pkl
-s, --save      Save changes to disk
```

Example:

```
autosubmit recovery cxxx -s
```

---

**Hint:** When we are satisfied with the results we can use the parameter `-s`, which will save the change to the pkl file and rename the update file.

---

The `-all` flag is used to synchronize all jobs of our experiment locally with the information available on the remote platform (i.e.: download the COMPLETED files we may not have). In case new files are found, the pkl will be updated.

Example:

```
autosubmit recovery cxxx -all -s
```

## 4.13 How to rerun a part of the experiment

This procedure allows you to create automatically a new pickle with a list of jobs of the experiment to rerun.

Using the `expdef_<expid>.conf` the `create` command will generate the rerun if the variable `RERUN` is set to `TRUE` and a `CHUNKLIST` is provided.

```
autosubmit create cxxx
```

It will read the list of chunks specified in the `CHUNKLIST` and will generate a new plot.

---

**Note:** The results are saved in the new pkl `rerun_job_list.pkl`.

---

Example:

```
vi <experiments_directory>/cxxx/conf/expdef_cxxx.conf

[...]
```

```
[rerun]
# Is a rerun or not? [Default: Do set FALSE]. BOOLEAN = TRUE, FALSE
RERUN = TRUE
# If RERUN = TRUE then supply the list of chunks to rerun
# LIST = "[ 19601101 [ fc0 [1 2 3 4] fc1 [1] ] 19651101 [ fc0 [16-30] ] ]"
CHUNKLIST = [ 19601101 [ fc1 [1] ] ]

[...]
```

Then you are able to start again Autosubmit for the rerun of cxxx 19601101, chunk 1, member 1:

```
nohup autosubmit run cxxx &
```

## 4.14 How to clean the experiment

This procedure allows you to save space after finalising an experiment. You must execute:

```
autosubmit clean EXPID
```

Options:

```
usage: autosubmit clean [-h] [-pr] [-p] [-s] expid
```

expid	experiment identifier
-h, --help	show this help message and exit
-pr, --project	clean project
-p, --plot	clean plot, only 2 last will remain
-s, --stats	clean stats, only last will remain

- The `-p` and `-s` flag are used to clean our experiment `plot` folder to save disk space. Only the two latest plots will be kept. Older plots will be removed.

Example:

```
autosubmit clean cxxx -p
```

- The `-pr` flag is used to clean our experiment `proj` locally in order to save space (it could be particullary big).

**Caution:** Bear in mind that if you have not synchronized your experiment project folder with the information available on the remote repository (i.e.: commit and push any changes we may have), or in case new files are found, the clean procedure will be failing although you specify the `-pr` option.

Example:

```
autosubmit clean cxxx -pr
```

A bare copy (which occupies less space on disk) will be automatically made.

---

**Hint:** That bare clone can be always reconverted in a working clone if we want to run again the experiment by using `git clone bare_clone original_clone`.

---

---

**Note:** In addition, every time you run this command with `-pr` option, it will check the commit unique identifier for local working tree existing on the `proj` directory. In case that commit identifier exists, clean will register it to the `expdef_cxxx.conf` file.

---

## 4.15 How to refresh the experiment project

To refresh the project directory of the experiment, use the command:

```
autosubmit refresh EXPID
```

*EXPID* is the experiment identifier.

It checks experiment configuration and copy code from original repository to project directory.

**Warning:** DO NOT USE THIS COMMAND IF YOU ARE NOT SURE ! Project directory will be overwritten and you may loose local changes.

Options:

```
usage: autosubmit refresh [-h] expid
```

```
    expid                experiment identifier

    -h, --help            show this help message and exit
    -mc, --model_conf     overwrite model conf file
```

Example:

```
autosubmit refresh cxxx
```

## 4.16 How to delete the experiment

To delete the experiment, use the command:

```
autosubmit delete EXPID
```

*EXPID* is the experiment identifier.

**Warning:** DO NOT USE THIS COMMAND IF YOU ARE NOT SURE ! It deletes the experiment from database and experiment's folder.

Options:

```
usage: autosubmit delete [-h] [-f] expid
```

```
    expid                experiment identifier

    -h, --help            show this help message and exit
    -f, --force           deletes experiment without confirmation
```

Example:

```
autosubmit delete cxxx
```

**Warning:** Be careful ! force option does not ask for your confirmation.

## 4.17 How to add a new job

To add a new job, open the <experiments\_directory>/cxxx/conf/jobs\_cxxx.conf file where cxxx is the experiment identifier and add this text:

```
[new_job]
FILE = <new_job_template>
```

This will create a new job named “new\_job” that will be executed once at the default platform. This job will use the template located at <new\_job\_template> (path is relative to project folder).

This is the minimum job definition and usually is not enough. You usually will need to add some other parameters:

- **PLATFORM:** allows you to execute the job in a platform of your choice. It must be defined in the experiment’s platforms.conf file or to have the value ‘LOCAL’ that always refers to the machine running Autosubmit
- **RUNNING:** defines if jobs run only once or once per startdate, member or chunk. Options are: once, date, member, chunk
- **DEPENDENCIES:** defines dependencies from job as a list of parents jobs separated by spaces. For example, if ‘new\_job’ has to wait for “old\_job” to finish, you must add the line “DEPENDENCIES = old\_job”. For dependencies to jobs running in previous chunks, members or startdates, use -(DISTANCE). For example, for a job “SIM” waiting for the previous “SIM” job to finish, you have to add “DEPENDENCIES = SIM-1”

For jobs running in HPC platforms, usually you have to provide information about processors, wallclock times and more. To do this use:

- **WALLCLOCK:** wallclock time to be submitted to the HPC queue in format HH:MM
- **PROCESSORS:** processors number to be submitted to the HPC. If not specified, defaults to 1.
- **THREADS:** threads number to be submitted to the HPC. If not specified, defaults to 1.
- **TASKS:** tasks number to be submitted to the HPC. If not specified, defaults to 1.
- **QUEUE:** queue to add the job to. If not specified, uses PLATFORM default.

There are also another, less used features that you can use:

- **FREQUENCY:** specifies that a job has only to be run after X dates, members or chunk. A job will always be created for the last one. If not specified, defaults to 1
- **RERUN\_ONLY:** determines if a job is only to be executed in reruns. If not specified, defaults to false.
- **RERUN\_DEPENDENCIES:** defines the jobs to be rerun if this job is going to be rerun. Syntax is identical to the used in DEPENDENCIES

Example:

```
[SIM]
FILE = templates/ecearth3/ecearth3.sim
DEPENDENCIES = INI SIM-1 CLEAN-2
RUNNING = chunk
WALLCLOCK = 04:00
PROCESSORS = 1616
THREADS = 1
TASKS = 1
```

## 4.18 How to add a new platform

To add a new platform, open the <experiments\_directory>/cxxx/conf/platforms\_cxxx.conf file where cxxx is the experiment identifier and add this text:

```
[new_platform]
TYPE = <platform_type>
HOST = <host_name>
PROJECT = <project>
USER = <user>
SCRATCH = <scratch_dir>
```

This will create a platform named “new\_platform”. The options specified are all mandatory:

- TYPE: queue type for the platform. Options supported are PBS, SGE, PS, LSF, ecaccess and SLURM
- HOST: hostname of the platform
- PROJECT: project for the machine scheduler.
- USER: user for the machine scheduler
- SCRATCH\_DIR: path to the scratch directory of the machine

**Warning:** With some platform types, Autosubmit may also need the version, forcing you to add the parameter VERSION. These platforms are PBS (options: 10, 11, 12) and ecaccess (options: pbs, loadleveler)

Some platforms may require to run serial jobs in a different queue or platform. To avoid changing the job configuration, you can specify what platform or queue to use to run serial jobs assigned to this platform:

- SERIAL\_PLATFORM: if specified, Autosubmit will run jobs with only one processor in the specified platform.
- SERIAL\_QUEUE: if specified, Autosubmit will run jobs with only one processor in the specified queue. Autosubmit will ignore this configuration if SERIAL\_PLATFORM is provided

There are some other parameters that you must need to specify:

- BUDGET: budget account for the machine scheduler. If omitted, takes the value defined in PROJECT
- ADD\_PROJECT\_TO\_HOST = option to add project name to host. This is required for some HPCs
- QUEUE: if given, Autosubmit will add jobs to the given queue instead of platform’s default queue
- TEST\_SUITE: if true, autosubmit test command can use this queue as a main queue. Defaults to false
- MAX\_WAITING\_JOBS: maximum number of jobs to be waiting in this platform.
- TOTAL\_JOBS: maximum number of jobs to be running at the same time in this platform.

Example:

```
[platform]
TYPE = SGE
HOST = hostname
PROJECT = my_project
ADD_PROJECT_TO_HOST = true
USER = my_user
SCRATCH_DIR = /scratch
TEST_SUITE = True
```

## 4.19 How to refresh an experiment

To refresh the project folder after creating the experiment use the command:

```
autosubmit refresh EXPID
```

*EXPID* is the experiment identifier.

Options:

```
usage: autosubmit refresh [-h] [-mc] expid
refresh project directory for an experiment
```

positional arguments:  
    expid                    experiment identifier

optional arguments:  
    -h, --help              show this help message and exit  
    -mc, --model\_conf      overwrite model conf file

Example:

```
autosubmit refresh cxxx
```

## 4.20 How to archive an experiment

To archive the experiment, use the command:

```
autosubmit archive EXPID
```

*EXPID* is the experiment identifier.

**Warning:** this command calls implicitly the clean command. Check clean command documentation.

**Warning:** experiment will be unusable after archiving. If you want to use it, you will need to call first the unarchive command

Options:

```
usage: autosubmit archive [-h] expid
```

    expid                    experiment identifier

    -h, --help              show this help message and exit

Example:

```
autosubmit archive cxxx
```

---

**Hint:** Archived experiment will be stored as a tar.gz file on a folder named after the year of the last COMPLETED file date. If not COMPLETED file is present, it will be stored in the folder matching the date at the time the archive command was run.

---

## 4.21 How to unarchive an experiment

To unarchive an experiment, use the command:

```
autosubmit unarchive EXPID
```

*EXPID* is the experiment identifier.

Options:

```
usage: autosubmit unarchive [-h] expid
```

    expid                    experiment identifier

`-h, --help` show this help message and exit

Example:

```
autosubmit unarchive cxxx
```



## TROUBLESHOOTING

### 5.1 How to change the job status stopping autosubmit

This procedure allows you to modify the status of your jobs.

**Warning:** Beware that Autosubmit must be stopped to use `setstatus`. Otherwise a running instance of Autosubmit, at some point, will overwrite any change you may have done.

You must execute:

```
autosubmit setstatus EXPID -fs STATUS_ORIGINAL -t STATUS_FINAL -s
```

*EXPID* is the experiment identifier. *STATUS\_ORIGINAL* is the original status to filter by the list of jobs. *STATUS\_FINAL* the desired target status.

Options:

```
usage: autosubmit setstatus [-h] [-s] -t
      {READY,COMPLETED,WAITING,SUSPENDED,FAILED,UNKNOWN,QUEUING,RUNNING}
      (-fl LIST
      | -fc FILTER_CHUNKS
      | -fs {Any,READY,COMPLETED,WAITING,SUSPENDED,FAILED,UNKNOWN}
      | -ft FILTER_TYPE)
      expid

expid          experiment identifier
-h, --help      show this help message and exit
-s, --save      Save changes to disk
-t {READY,COMPLETED,WAITING,SUSPENDED,FAILED,UNKNOWN},
      --status_final {READY,COMPLETED,WAITING,SUSPENDED,FAILED,UNKNOWN}
                  Supply the target status
-fc FILTER_CHUNKS, --filter_chunks FILTER_CHUNKS
                  Supply the list of chunks to change the status.
                  Default = "Any". LIST = "[ 19601101 [ fc0 [1 2 3 4]
                  fc1 [1] ] 19651101 [ fc0 [16-30] ] ]"
-fs {Any,READY,COMPLETED,WAITING,SUSPENDED,FAILED,UNKNOWN},
      --filter_status {Any,READY,COMPLETED,WAITING,SUSPENDED,FAILED,UNKNOWN}
                  Select the original status to filter the list of jobs
-ft FILTER_TYPE, --filter_type FILTER_TYPE
                  Select the job type to filter the list of jobs
```

Examples:

```
autosubmit setstatus cxxx -fl "cxxx_20101101_fc3_21_sim cxxx_20111101_fc4_26_sim" -t READY -s
autosubmit setstatus cxxx -fc [ 19601101 [ fc1 [1] ] ] -t READY -s
autosubmit setstatus cxxx -fs FAILED -t READY -s
autosubmit setstatus cxxx -ft TRANSFER -t SUSPENDED -s
```

This script has two mandatory arguments.

The `-t` where you must specify the target status of the jobs you want to change to:

```
{READY, COMPLETED, WAITING, SUSPENDED, FAILED, UNKNOWN}
```

The second argument has four alternatives, the `-fl`, `-fc`, `-fs` and `-ft`; with those we can apply a filter for the jobs we want to change:

- The `-fl` variable receives a list of jobnames separated by blank spaces: e.g.:

```
"cxxx_20101101_fc3_21_sim cxxx_20111101_fc4_26_sim"
```

If we supply the key word “Any”, all jobs will be changed to the target status.

- The variable `-fc` should be a list of individual chunks or ranges of chunks in the following format:

```
[ 19601101 [ fc0 [1 2 3 4] fc1 [1] ] 19651101 [ fc0 [16-30] ] ]
```

- The variable `-fs` can be one of the following status for job:

```
{Any, READY, COMPLETED, WAITING, SUSPENDED, FAILED, UNKNOWN}
```

- The variable `-ft` can be one of the defined types of job.

---

**Hint:** When we are satisfied with the results we can use the parameter `-s`, which will save the change to the `pkl` file.

---

## 5.2 How to change the job status without stopping autosubmit

This procedure allows you to modify the status of your jobs without having to stop Autosubmit.

You must create a file in `<experiments_directory>/<expid>/pkl/` named:

```
updated_list_<expid>.txt
```

Format:

This file should have two columns: the first one has to be the `job_name` and the second one the status.

Options:

```
READY, COMPLETED, WAITING, SUSPENDED, FAILED, UNKNOWN
```

Example:

```
vi updated_list_cxxx.txt
```

```
cxxx_20101101_fc3_21_sim    READY
cxxx_20111101_fc4_26_sim    READY
```

If Autosubmit finds the above file, it will process it. You can check that the processing was OK at a given date and time, if you see that the file name has changed to:

update\_list\_<expid>\_<date>\_<time>.txt

---

**Note:** A running instance of Autosubmit will check the existence of above file after checking already submitted jobs. It may take some time, depending on the setting `SAFETYSLEEPTIME`.

---

**Warning:** Keep in mind that autosubmit reads the file automatically so it is suggested to create the file in another location like `/tmp` or `/var/tmp` and then copy/move it to the `pkl` folder. Alternatively you can create the file with a different name and rename it when you have finished.



## DEVELOPING A PROJECT

Autosubmit is used at IC3 to run EC-Earth. To do that, a git repository has been created that contains the model source code and the scripts used to run the tasks.

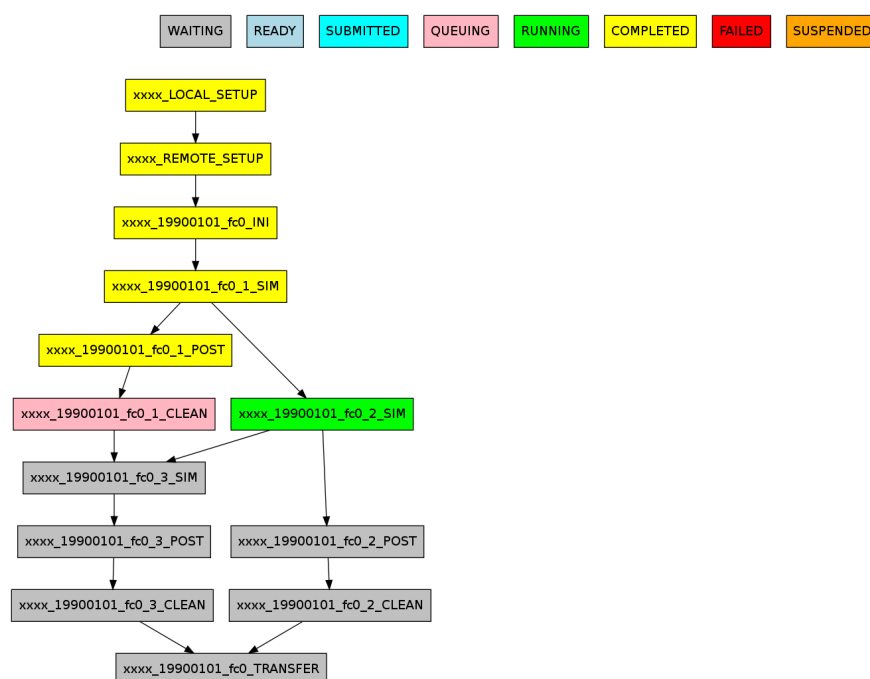


Figure 6.1: Example of monitoring plot for EC-Earth run with Autosubmit for 1 start date, 1 member and 3 chunks.

The workflow is defined using seven job types, as shown in the figure above. These job types are:

- Local\_setup: prepares a patch for model changes and copies it to HPC.
- Remote\_setup: creates a model copy and applies the patch to it.
- Ini: prepares model to start the simulation of one member.
- Sim: runs a simulation chunk (usually 1 to 3 months).
- Post: post-process outputs for one simulation chunk.
- Clean: removes unnecessary outputs from the simulated chunk.
- Transfer: transfers post-processed outputs to definitive storage.

Since Autosubmit 2.2 the user can select the desired source repository for the experiment project and using a given concrete branch is possible. This introduces a better version control system for project and more options to create new experiments based on different developments by the user. The different projects contain the shell script to run, for each job type (local setup, remote setup, ini, sim, post, clean and transfer) that are platform independent. Additionally the user can modify the sources under proj folder. The executable scripts are created at runtime so the modifications on the sources can be done on the fly.

**Warning:** Autosubmit automatically adds small shell script code blocks in the header and the tailer of your scripts, to control the workflow. Please, remove any exit command in the end of your scripts, e.g. `exit 0`.

---

**Important:** For a complete reference on how to develop an EC-Earth project, please have a look in the following wiki page: <http://ic3.cat/wikicfu/index.php/Models>

---

## MODULE DOCUMENTATION

### 7.1 autosubmit

Main module for autosubmit. Only contains an interface class to all functionality implemented on autosubmit

**class** `autosubmit.autosubmit.Autosubmit`

Interface class for autosubmit.

**static archive** (*expid*)

Archives an experiment: compress folder to tar.gz and moves to year's folder

**Parameters** *expid* (*str*) – experiment identifier

**static check** (*expid*)

Checks experiment configuration and warns about any detected error or inconsistency.

**Parameters** *expid* (*str*) – experiment identifier:

**static clean** (*expid*, *project*, *plot*, *stats*, *create\_log\_file=True*)

Clean experiment's directory to save storage space. It removes project directory and outdated plots or stats.

**Parameters**

- **expid** (*str*) – identifier of experiment to clean
- **project** (*bool*) – set True to delete project directory
- **plot** (*bool*) – set True to delete outdated plots
- **stats** (*bool*) – set True to delete outdated stats

**static configure** (*database\_path*, *database\_filename*, *local\_root\_path*, *platforms\_conf\_path*,  
*jobs\_conf\_path*, *machine*, *local*)

Configure several paths for autosubmit: database, local root and others. Can be configured at system, user or local levels. Local level configuration precedes user level and user level precedes system configuration.

**Parameters**

- **database\_path** (*str*) – path to autosubmit database
- **database\_path** – path to autosubmit database
- **local\_root\_path** (*str*) – path to autosubmit's experiments' directory
- **platforms\_conf\_path** (*str*) – path to platforms conf file to be used as model for new experiments
- **jobs\_conf\_path** (*str*) – path to jobs conf file to be used as model for new experiments
- **machine** (*bool*) – True if this configuration has to be stored for all the machine users

- **local** (*bool*) – True if this configuration has to be stored in the local path

**static create** (*expid, noplot*)

Creates job list for given experiment. Configuration files must be valid before realizing this process.

**Parameters**

- **expid** (*str*) – experiment identifier
- **noplot** (*bool*) – if True, method omits final plotting of joblist. Only needed on large experiments when plotting time can be much larger than creation time.

**Returns** True if successful, False if not

**Return type** bool

**static delete** (*expid, force*)

Deletes and experiment from database and experiment's folder

**Parameters**

- **expid** (*str*) – identifier of the experiment to delete
- **force** (*bool*) – if True, does not ask for confirmation

**Returns** True if successful, False if not

**Return type** bool

**static expid** (*hpc, description, copy\_id='', dummy=False, test=False*)

Creates a new experiment for given HPC

**Parameters**

- **hpc** (*str*) – name of the main HPC for the experiment
- **description** (*str*) – short experiment's description.
- **copy\_id** (*str*) – experiment identifier of experiment to copy
- **dummy** (*bool*) – if true, writes a default dummy configuration for testing
- **test** – if true, creates an experiment for testing

**Returns** experiment identifier. If method fails, returns ''.

**Return type** str

**static install** ()

Creates a new database instance for autosubmit at the configured path

**static monitor** (*expid, file\_format*)

Plots workflow graph for a given experiment with status of each job coded by node color. Plot is created in experiment's plot folder with name <expid>\_<date>\_<time>.<file\_format>

**Parameters**

- **expid** (*str*) – identifier of the experiment to plot
- **file\_format** (*str*) – plot's file format. It can be pdf, png or ps

**static parse\_args** ()

Parse arguments given to an executable and start execution of command given

**static recovery** (*expid, save, all\_jobs*)

TODO

**Parameters**

- **expid** (*str*) – identifier of the experiment to recover
- **save** (*bool*) – If true, recovery saves changes to joblist
- **all\_jobs** (*bool*) – if True, it tries to get completed files for all jobs, not only active.

**static refresh** (*expid, model\_conf*)

Refresh project folder for given experiment

**Parameters** **expid** (*str*) – experiment identifier

**static run\_experiment** (*expid*)

Runs and experiment (submitting all the jobs properly and repeating its execution in case of failure).

**Parameters** **expid** (*str*) – identifier of experiment to be run

**Returns** True if run to the end, False otherwise

**Return type** bool

**static set\_status** (*expid, save, final, lst, filter\_chunks, filter\_status, filter\_section*)

TODO

**Parameters**

- **expid** (*str*) – experiment identifier
- **save** (*bool*) –
- **final** (*str*) –
- **lst** (*str*) –
- **filter\_chunks** (*str*) –
- **filter\_status** (*str*) –
- **filter\_section** (*str*) –

**static statistics** (*expid, file\_format*)

Plots statistics graph for a given experiment. Plot is created in experiment's plot folder with name <expid>\_<date>\_<time>.<file\_format>

**Parameters**

- **expid** (*str*) – identifier of the experiment to plot
- **file\_format** (*str*) – plot's file format. It can be pdf, png or ps

**static test** (*expid, chunks, member=None, stardate=None, hpc=None, branch=None*)

Method to conduct a test for a given experiment. It creates a new experiment for a given experiment with a given number of chunks with a random start date and a random member to be run on a random HPC.

**Parameters**

- **expid** (*str*) – experiment identifier
- **chunks** (*int*) – number of chunks to be run by the experiment
- **member** (*str*) – member to be used by the test. If None, it uses a random one from which are defined on the experiment.
- **stardate** (*str*) – start date to be used by the test. If None, it uses a random one from which are defined on the experiment.
- **hpc** (*str*) – HPC to be used by the test. If None, it uses a random one from which are defined on the experiment.

- **branch** (*str*) – branch or revision to be used by the test. If None, it uses configured branch.

**Returns** True if test was succesful, False otherwise

**Return type** bool

**static unarchive** (*expid*)

Archives an experiment: compress folder to tar.gz and moves to year's folder

**Parameters** **expid** (*str*) – experiment identifier

## 7.2 autosubmit.config

### 7.2.1 autosubmit.config.basicConfig

**class** `autosubmit.config.basicConfig.BasicConfig`

Class to manage configuration for autosubmit path, database and default values for new experiments

**static read** ()

Reads configuration from .autosubmitrc files, first from /etc, then for user directory and last for current path.

### 7.2.2 autosubmit.config.config\_common

**class** `autosubmit.config.config_common.AutosubmitConfig` (*expid*)

Class to handle experiment configuration coming from file or database

**check\_conf\_files** ()

Checks configuration files (autosubmit, experiment jobs and platforms), looking for invalid values, missing required options. Prints results in log

**Returns** True if everithing is correct, False if it founds any error

**Return type** bool

**static check\_exists** (*parser, section, option*)

Checks if an option exists in given parser

**Parameters**

- **parser** (*SafeConfigParser*) – parser to use
- **section** (*str*) – section that contains the option
- **option** (*str*) – option to check

**Returns** True if option exists, False otherwise

**Return type** bool

**static check\_is\_boolean** (*parser, section, option, must\_exist*)

Checks if an option is a boolean value in given parser

**Parameters**

- **parser** (*SafeConfigParser*) – parser to use
- **section** (*str*) – section that contains the option
- **option** (*str*) – option to check
- **must\_exist** (*bool*) – if True, option must exist

**Returns** True if option value is boolean, False otherwise

**Return type** bool

**static check\_is\_choice** (*parser, section, option, must\_exist, choices*)

Checks if an option is a valid choice in given parser

**Parameters**

- **parser** (*SafeConfigParser*) – parser to use
- **section** (*str*) – section that contains the option
- **option** (*str*) – option to check
- **must\_exist** (*bool*) – if True, option must exist
- **choices** (*list*) – valid choices

**Returns** True if option value is a valid choice, False otherwise

**Return type** bool

**static check\_is\_int** (*parser, section, option, must\_exist*)

Checks if an option is an integer value in given parser

**Parameters**

- **parser** (*SafeConfigParser*) – parser to use
- **section** (*str*) – section that contains the option
- **option** (*str*) – option to check
- **must\_exist** (*bool*) – if True, option must exist

**Returns** True if option value is integer, False otherwise

**Return type** bool

**static check\_json** (*key, value*)

Checks if value is a valid json

**Parameters**

- **key** (*str*) – key to check
- **value** (*str*) – value

**Returns** True if value is a valid json, False otherwise

**Return type** bool

**check\_parameters** ()

Function to check configuration of Autosubmit.

**Returns** True if all variables are set. If some parameter do not exist, the function returns False.

**Return type** bool

**check\_proj** ()

Checks project config file

**Returns** True if everything is correct, False if it founds any error

**Return type** bool

**static check\_regex** (*parser, section, option, must\_exist, regex*)

Checks if an option complies with a regular expression in given parser

**Parameters**

- **parser** (*SafeConfigParser*) – parser to use
- **section** (*str*) – section that contains the option
- **option** (*str*) – option to check
- **must\_exist** (*bool*) – if True, option must exist
- **regex** (*str*) – regular expression to check

**Returns** True if option complies with regex, False otherwise

**Return type** bool

**experiment\_file**

Returns experiment's config file name

**static get\_bool\_option** (*parser, section, option, default*)

Gets a boolean option from given parser

**Parameters**

- **parser** (*SafeConfigParser*) – parser to use
- **section** (*str*) – section that contains the option
- **option** (*str*) – option to get
- **default** (*bool*) – value to be returned if option is not present

**Returns** option value

**Return type** bool

**get\_chunk\_list** ()

Returns chunk list from experiment's config file

**Returns** experiment's chunks

**Return type** list

**get\_chunk\_size\_unit** ()

Unit for the chunk length

**Returns** Unit for the chunk length Options: {hour, day, month, year}

**Return type** str

**get\_date\_list** ()

Returns startdates list from experiment's config file

**Returns** experiment's startdates

**Return type** list

**get\_exp\_id** ()

Returns experiment identifier read from experiment's config file

**Returns** experiment identifier

**Return type** str

**get\_file\_project\_conf** ()

Returns path to project config file from experiment config file

**Returns** path to project config file

**Return type** str

**get\_git\_project\_branch()**

Returns git branch from experiment's config file

**Returns** git branch

**Return type** str

**get\_git\_project\_commit()**

Returns git commit from experiment's config file

**Returns** git commit

**Return type** str

**get\_git\_project\_origin()**

Returns git origin from experiment config file

**Returns** git origin

**Return type** str

**get\_local\_project\_path()**

Gets path to origin for local project

**Returns** path to local project

**Return type** str

**get\_max\_waiting\_jobs()**

Returns max number of waiting jobs from autosubmit's config file

**Returns** main platforms

**Return type** int

**get\_member\_list()**

Returns members list from experiment's config file

**Returns** experiment's members

**Return type** list

**get\_num\_chunks()**

Returns number of chunks to run for each member

**Returns** number of chunks

**Return type** int

**static get\_option(parser, section, option, default)**

Gets an option from given parser

**Parameters**

- **parser** (*SafeConfigParser*) – parser to use
- **section** (*str*) – section that contains the option
- **option** (*str*) – option to get
- **default** (*object*) – value to be returned if option is not present

**Returns** option value

**Return type** str

**static get\_parser** (*file\_path*)

Gets parser for given file

**Parameters** **file\_path** (*str*) – path to file to be parsed

**Returns** parser

**Return type** SafeConfigParser

**get\_platform** ()

Returns main platforms from experiment's config file

**Returns** main platforms

**Return type** str

**get\_project\_destination** ()

Returns git commit from experiment's config file

**Returns** git commit

**Return type** str

**get\_project\_dir** ()

Returns experiment's project directory

**Returns** experiment's project directory

**Return type** str

**get\_project\_type** ()

Returns project type from experiment config file

**Returns** project type

**Return type** str

**get\_rerun** ()

Returns startdates list from experiment's config file

**Returns** rerun value

**Return type** list

**get\_retrials** ()

Returns max number of retrials for job from autosubmit's config file

**Returns** safety sleep time

**Return type** int

**get\_safetysleeptime** ()

Returns safety sleep time from autosubmit's config file

**Returns** safety sleep time

**Return type** int

**get\_svn\_project\_revision** ()

Get revision for subversion project

**Returns** revision for subversion project

**Return type** str

**get\_svn\_project\_url** ()

Gets subversion project url

**Returns** subversion project url

**Return type** str

**get\_total\_jobs** ()

Returns max number of running jobs from autosubmit's config file

**Returns** max number of running jobs

**Return type** int

**load\_parameters** ()

Load parameters from experiment and autosubmit config files. If experiment's type is not none, also load parameters from model's config file

**Returns** a dictionary containing tuples [parameter\_name, parameter\_value]

**Return type** dict

**load\_project\_parameters** ()

Loads parameters from model config file

**Returns** dictionary containing tuples [parameter\_name, parameter\_value]

**Return type** dict

**platforms\_file**

Returns experiment's platforms config file name

**Returns** platforms config file's name

**Return type** str

**static print\_parameters** (*title, parameters*)

Prints the parameters table in a tabular mode

**Parameters**

- **title** (*str*) – table's title
- **parameters** – parameters to print

**Type** list

**project\_file**

Returns project's config file name

**read\_platforms\_conf** ()

Read platforms configuration file and create defined platforms. Also adds the local remote\_platform to the list

**Returns** platforms defined on file and local remote\_platform. None if configuration is invalid

**Return type** list

**reload** ()

Creates parser objects for configuration files

**set\_exp\_id** (*exp\_id*)

Set experiment identifier in autosubmit and experiment config files

**Parameters** **exp\_id** (*str*) – experiment identifier to store

**set\_git\_project\_commit** (*as\_conf*)

Function to register in the configuration the commit SHA of the git project version. :param as\_conf: Configuration class for experiment :type as\_conf: AutosubmitConfig

**set\_platform** (*hpc*)

Sets main platforms in experiment's config file

**Parameters** **hpc** – main platforms

**Type** str

**set\_safetysleeptime** (*sleep\_time*)

Sets autosubmit's version in autosubmit's config file

**Parameters** **sleep\_time** (*int*) – value to set

**set\_version** (*autosubmit\_version*)

Sets autosubmit's version in autosubmit's config file

**Parameters** **autosubmit\_version** (*str*) – autosubmit's version

### 7.2.3 autosubmit.config.log

**class** autosubmit.config.log.**Log**

Static class to manage the log for the application. Messages will be sent to console and to file if it is configured. Levels can be set for each output independently. These levels are (from lower to higher priority):

- **EVERYTHING** : this level is just defined to show every output
- **DEBUG**
- **INFO**
- **RESULT**
- **USER\_WARNING**
- **WARNING**
- **ERROR**
- **CRITICAL**
- **NO\_LOG** : this level is just defined to remove every output

**static critical** (*msg, \*args*)

Sends critical errors to the log. It will be shown in red in the console.

**Parameters**

- **msg** – message to show
- **args** – arguments for message formatting (it will be done using `format()` method on str)

**static debug** (*msg, \*args*)

Sends debug information to the log

**Parameters**

- **msg** – message to show
- **args** – arguments for message formatting (it will be done using `format()` method on str)

**static error** (*msg, \*args*)

Sends errors to the log. It will be shown in red in the console.

**Parameters**

- **msg** – message to show
- **args** – arguments for message formatting (it will be done using `format()` method on str)

**static info** (*msg, \*args*)

Sends information to the log

**Parameters**

- **msg** – message to show
- **args** – arguments for message formatting (it will be done using format() method on str)

**static result** (*msg, \*args*)

Sends results information to the log. It will be shown in green in the console.

**Parameters**

- **msg** – message to show
- **args** – arguments for message formatting (it will be done using format() method on str)

**static set\_console\_level** (*level*)

Sets log level for logging to console. Every output of level equal or higher to parameter level will be printed on console

**Parameters** **level** – new level for console

**Returns** None

**static set\_file** (*file\_path*)

Configure the file to store the log. If another file was specified earlier, new messages will only go to the new file.

**Parameters** **file\_path** (*str*) – file to store the log

**static set\_file\_level** (*level*)

Sets log level for logging to file. Every output of level equal or higher to parameter level will be added to log file

**Parameters** **level** – new level for log file

**static user\_warning** (*msg, \*args*)

Sends warnings for the user to the log. It will be shown in yellow in the console.

**Parameters**

- **msg** – message to show
- **args** – arguments for message formatting (it will be done using format() method on str)

**static warning** (*msg, \*args*)

Sends program warnings to the log. It will be shown in yellow in the console.

**Parameters**

- **msg** – message to show
- **args** – arguments for message formatting (it will be done using format() method on str)

**class** autosubmit.config.log.**LogFormatter** (*to\_file=False*)

Class to format log output.

**Parameters** **to\_file** (*bool*) – If True, creates a LogFormatter for files; if False, for console

**format** (*record*)

Format log output, adding labels if needed for log level. If logging to console, also manages font color. If logging to file adds timestamp

**Parameters** **record** (*LogRecord*) – log record to format

**Returns** formatted record

**Return type** str

## 7.3 autosubmit.database

Module containing functions to manage autosubmit's database.

**exception** `autosubmit.database.db_common.DbException` (*message*)

Exception class for database errors

`autosubmit.database.db_common.base36decode` (*number*)

Converts a base36 string to a positive integer

**Parameters** *number* (*str*) – base36 string to convert

**Returns** number's integer value

**Return type** int

`autosubmit.database.db_common.base36encode` (*number*, *alphabet='0123456789abcdefghijklmnopqrstuvwxyz'*)

Convert positive integer to a base36 string.

**Parameters**

- **number** (*int*) – number to convert
- **alphabet** (*str*) – set of characters to use

**Returns** number's base36 string value

**Return type** str

`autosubmit.database.db_common.check_db` ()

Checks if database file exist

**Returns** None if exists, terminates program if not

`autosubmit.database.db_common.check_experiment_exists` (*name*, *error\_on\_inexistence=True*)

Checks if exist an experiment with the given name.

**Parameters** *name* (*str*) – Experiment name

**Returns** If experiment exists returns true, if not returns false

**Return type** bool

`autosubmit.database.db_common.check_name` (*name*)

Checks if it is a valid experiment identifier

**Parameters** *name* (*str*) – experiment identifier to check

**Returns** name if is valid, terminates program otherwise

**Return type** str

`autosubmit.database.db_common.close_conn` (*conn*, *cursor*)

Commits changes and close connection to database

**Parameters**

- **conn** (*sqlite3.Connection*) – connection to close
- **cursor** (*sqlite3.Cursor*) – cursor to close

`autosubmit.database.db_common.copy_experiment` (*name, description, version, test=False*)

Creates a new experiment by copying an existing experiment

**Parameters**

- **name** (*str*) – identifier of experiment to copy
- **description** (*str*) – experiment’s description

**Returns** experiment id for the new experiment

**Return type** `str`

`autosubmit.database.db_common.create_db` (*qry*)

Creates a new database for autosubmit

**Parameters** **qry** (*str*) – query to create the new database

`autosubmit.database.db_common.delete_experiment` (*name*)

Removes experiment from database

**Parameters** **name** (*str*) – experiment identifier

**Returns** True if delete is succesful

**Return type** `bool`

`autosubmit.database.db_common.last_name_used` (*test=False*)

Gets last experiment identifier used

**Parameters** **test** (*bool*) – flag for test experiments

**Returns** last experiment identifier used, ‘empty’ if there is none

**Return type** `str`

`autosubmit.database.db_common.new_experiment` (*description, version, test=False*)

Stores a new experiment on the database and generates its identifier

**Parameters**

- **test** (*bool*) – flag for test experiments
- **description** (*str*) – experiment’s description

**Returns** experiment id for the new experiment

**Return type** `str`

`autosubmit.database.db_common.open_conn` (*check\_version=True*)

Opens a connection to database

**Returns** connection object, cursor object

**Return type** `sqlite3.Connection, sqlite3.Cursor`

## 7.4 autosubmit.date

In this python script there are tools to manipulate the dates and make mathematical operations between them.

`autosubmit.date.chunk_date_lib.add_days` (*date, number\_of\_days, cal*)

Adds days to a date

**Parameters**

- **date** (*datetime.datetime*) – base date

- **number\_of\_days** (*int*) – number of days to add
- **cal** (*str*) – calendar to use

**Returns** base date plus added days

**Return type** date

`autosubmit.date.chunk_date_lib.add_hours (date, number_of_hours, cal)`  
Adds hours to a date

**Parameters**

- **date** (*datetime.datetime*) – base date
- **number\_of\_hours** (*int*) – number of hours to add
- **cal** (*str*) – calendar to use

**Returns** base date plus added hours

**Return type** date

`autosubmit.date.chunk_date_lib.add_months (date, number_of_months, cal)`  
Adds months to a date

**Parameters**

- **date** (*datetime.datetime*) – base date
- **number\_of\_months** (*int*) – number of months to add
- **cal** (*str*) – calendar to use

**Returns** base date plus added months

**Return type** date

`autosubmit.date.chunk_date_lib.add_time (date, total_size, chunk_unit, cal)`  
Adds given time to a date

**Parameters**

- **date** (*datetime.datetime*) – base date
- **total\_size** (*int*) – time to add
- **chunk\_unit** (*str*) – unit of time to add
- **cal** (*str*) – calendar to use

**Returns** result of adding time to base date

**Return type** datetime.datetime

`autosubmit.date.chunk_date_lib.add_years (date, number_of_years)`  
Adds years to a date

**Parameters**

- **date** (*datetime.datetime*) – base date
- **number\_of\_years** (*int*) – number of years to add

**Returns** base date plus added years

**Return type** date

`autosubmit.date.chunk_date_lib.chunk_end_date` (*start\_date*, *chunk\_length*, *chunk\_unit*, *cal*)

Gets chunk interval end date

**Parameters**

- **start\_date** (*datetime.datetime*) – chunk’s start date
- **chunk\_length** (*int*) – length of the chunks
- **chunk\_unit** (*str*) – chunk length unit
- **cal** (*str*) – calendar to use

**Returns** chunk’s end date

**Return type** `datetime.datetime`

`autosubmit.date.chunk_date_lib.chunk_start_date` (*date*, *chunk*, *chunk\_length*, *chunk\_unit*, *cal*)

Gets chunk’s interval start date

**Parameters**

- **date** (*datetime.datetime*) – start date for member
- **chunk** (*int*) – number of chunk
- **chunk\_length** (*int*) – length of chunks
- **chunk\_unit** (*str*) – chunk length unit
- **cal** (*str*) – calendar to use

**Returns** chunk’s start date

**Return type** `datetime.datetime`

`autosubmit.date.chunk_date_lib.date2str` (*date*, *date\_format*='')

Converts a datetime object to a str

**Parameters** **date** (*datetime.datetime*) – date to convert

**Return type** `str`

`autosubmit.date.chunk_date_lib.parse_date` (*string\_date*)

Parses a string into a datetime object

**Parameters** **string\_date** (*str*) – string to parse

**Return type** `datetime.datetime`

`autosubmit.date.chunk_date_lib.previous_day` (*date*, *cal*)

Gets previous day

**Parameters**

- **date** (*datetime.datetime*) – base date
- **cal** (*str*) – calendar to use

**Returns** base date minus one day

**Return type** `datetime.datetime`

`autosubmit.date.chunk_date_lib.sub_days` (*date*, *number\_of\_days*, *cal*)

Subtract days to a date

**Parameters**

- **date** (*datetime.datetime*) – base date
- **number\_of\_days** (*int*) – number of days to subtract
- **cal** (*str*) – calendar to use

**Returns** base date minus subtracted days

**Return type** *datetime.datetime*

`autosubmit.date.chunk_date_lib.subs_dates(start_date, end_date, cal)`  
Gets days between start\_date and end\_date

**Parameters**

- **start\_date** (*datetime.datetime*) – interval's start date
- **end\_date** (*datetime.datetime*) – interval's end date
- **cal** (*str*) – calendar to use

**Returns** interval length in days

**Return type** *int*

## 7.5 autosubmit.git

**class** `autosubmit.git.git_common.AutosubmitGit` (*expid*)

Class to handle experiment git repository

**Parameters** **expid** (*str*) – experiment identifier

**static clean\_git** (*as\_conf*)

Function to clean space on BasicConfig.LOCAL\_ROOT\_DIR/git directory.

**Parameters** **as\_conf** (*autosubmit.config.AutosubmitConfig*) – experiment configuration

## 7.6 autosubmit.job

Main module for autosubmit. Only contains an interface class to all functionality implemented on autosubmit

**class** `autosubmit.job.job.Job` (*name, jobid, status, priority*)

Class to handle all the tasks with Jobs at HPC. A job is created by default with a name, a jobid, a status and a type. It can have children and parents. The inheritance reflects the dependency between jobs. If Job2 must wait until Job1 is completed then Job2 is a child of Job1. Inversely Job1 is a parent of Job2

**Parameters**

- **name** (*str*) – job's name
- **jobid** (*int*) – job's identifier
- **status** (*Status*) – job initial status
- **priority** (*int*) – job's priority

**add\_parent** (*\*new\_parent*)

Add parents for the job. It also adds current job as a child for all the new parents

**Parameters** **\*new\_parent** (*Job*) – job parent

**ancestors**

Returns all job's ancestors

**Returns** job ancestors

**Return type** set

**check\_completion** (*default\_status=-1*)

Check the presence of *COMPLETED* file and touch a Checked or failed file. Change status to COMPLETED if *COMPLETED* file exists and to FAILED otherwise.

**check\_end\_time** ()

Returns end time from completed file

**Returns** completed date and time

**Return type** str

**check\_fail\_queued\_time** ()

Returns total time spent waiting for failed jobs

**Returns** total time waiting in HPC platforms for failed jobs

**Return type** str

**check\_fail\_run\_time** ()

Returns total time running for failed jobs

**Returns** total time running in HPC for failed jobs

**Return type** str

**check\_failed\_times** ()

Returns number of failed attempts before completing the job

**Returns** failed attempts to run

**Return type** str

**check\_queued\_time** ()

Returns job's waiting time in HPC

**Returns** total time waiting in HPC platforms

**Return type** str

**check\_run\_time** ()

Returns job's running time

**Returns** total time running

**Return type** str

**check\_script** (*as\_conf, parameters*)

Checks if script is well formed

**Parameters** *as\_conf* (*AutosubmitConfig*) – configuration file

**Returns** true if not problem has been detected, false otherwise

**Return type** bool

**children**

Returns a list containing all children of the job

**Returns** child jobs

**Return type** set

**compare\_by\_id** (*other*)

Compare jobs by ID

**Parameters** *other* (*Job*) – job to compare

**Returns** comparison result

**Return type** bool

**compare\_by\_name** (*other*)

Compare jobs by name

**Parameters** *other* (*Job*) – job to compare

**Returns** comparison result

**Return type** bool

**compare\_by\_status** (*other*)

Compare jobs by status value

**Parameters** *other* (*Job*) – job to compare

**Returns** comparison result

**Return type** bool

**create\_script** (*as\_conf*)

Creates script file to be run for the job

**Parameters** *as\_conf* (*AutosubmitConfig*) – configuration object

**Returns** script's filename

**Return type** str

**delete\_child** (*child*)

Removes a child from the job

**Parameters** *child* (*Job*) – child to remove

**delete\_parent** (*parent*)

Remove a parent from the job

**Parameters** *parent* (*Job*) – parent to remove

**get\_platform** ()

Returns the platforms to be used by the job. Chooses between serial and parallel platforms

:return HPCPlatform object for the job to use :rtype: HPCPlatform

**get\_queue** ()

Returns the queue to be used by the job. Chooses between serial and parallel platforms

:return HPCPlatform object for the job to use :rtype: HPCPlatform

**has\_children** ()

Returns true if job has any children, else return false

**Returns** true if job has any children, otherwise return false

**Return type** bool

**has\_parents** ()

Returns true if job has any parents, else return false

**Returns** true if job has any parent, otherwise return false

**Return type** bool

**inc\_fail\_count** ()

Increments fail count

**log\_job** ()

Prints job information in log

**long\_name**

Job's long name. If not setted, returns name

**Returns** long name

**Return type** str

**parents**

Return parent jobs list

**Returns** parent jobs

**Return type** set

**print\_job** ()

Prints debug information about the job

**print\_parameters** ()

Print sjob parameters in log

**remove\_dependencies** ()

Checks if job is completed and then remove dependencies for childs

**set\_platform** (*value*)

Sets the HPC platforms to be used by the job.

**Parameters** *value* (*HPCPlatform*) – platforms to set

**set\_queue** (*value*)

Sets the queue to be used by the job.

**Parameters** *value* (*HPCPlatform*) – queue to set

**short\_name**

Job short name

**Returns** short name

**Return type** str

**update\_content** (*project\_dir*)

Create the script content to be run for the job

**Parameters** *project\_dir* (*str*) – project directory

**Returns** script code

**Return type** str

**update\_parameters** (*as\_conf*, *parameters*)

Refresh parameters value

**Parameters**

- *as\_conf* (*AutosubmitConfig*) –
- *parameters* (*dict*) –

**class** `autosubmit.job.job_common.StatisticsSnippet`

Class to handle the statistics snippet of a job. It contains header and tailer for local and remote jobs

**class** `autosubmit.job.job_common.Status`

Class to handle the status of a job

**class** `autosubmit.job.job_list.DicJobs` (*joblist*, *parser*, *date\_list*, *member\_list*, *chunk\_list*, *date\_format*)

Class to create jobs from conf file and to find jobs by stardate, member and chunk

#### Parameters

- **joblist** (*JobList*) – joblist to use
- **parser** (*SafeConfigParser*) – jobs conf file parser
- **date\_list** (*list*) – startdates
- **member\_list** (*list*) – member
- **chunk\_list** (*list*) – chunks
- **date\_format** (*str*) – option to formate dates

**get\_jobs** (*section*, *date=None*, *member=None*, *chunk=None*)

Return all the jobs matching section, date, member and chunk provided. If any parameter is none, returns all the jobs without checking that parameter value. If a job has one parameter to None, is returned if all the others match parameters passed

#### Parameters

- **section** (*str*) – section to return
- **date** (*str*) – stardate to return
- **member** (*str*) – member to return
- **chunk** (*int*) – chunk to return

**Returns** jobs matching parameters passed

**Return type** list

**get\_option** (*section*, *option*, *default*)

Returns value for a given option

#### Parameters

- **section** (*str*) – section name
- **option** (*str*) – option to return
- **default** (*object*) – value to return if not defined in configuration file

**read\_section** (*section*, *priority*)

Read a section from jobs conf and creates all jobs for it

#### Parameters

- **section** (*str*) – section to read
- **priority** (*int*) – priority for the jobs

**class** `autosubmit.job.job_list.JobList` (*expid*)

Class to manage the list of jobs to be run by autosubmit

**Parameters** **expid** (*str*) – experiment's identifier

**check\_scripts** (*as\_conf*)

When we have created the scripts, all parameters should have been substituted. %PARAMETER% handlers not allowed

**Parameters** *as\_conf* (*AutosubmitConfig*) – experiment configuration

**create** (*date\_list*, *member\_list*, *num\_chunks*, *parameters*, *date\_format*)

Creates all jobs needed for the current workflow

**Parameters**

- **date\_list** (*list*) – start dates
- **member\_list** (*list*) – members
- **num\_chunks** (*int*) – number of chunks to run
- **parameters** (*dict*) – parameters for the jobs
- **date\_format** (*str*) – option to format dates

**expid**

Returns experiment identifier

**Returns** experiment's identifier

**Return type** *str*

**get\_active** (*platform=None*)

Returns a list of active jobs (In platforms, Ready)

**Parameters** *platform* (*HPCPlatform*) – job platform

**Returns** active jobs

**Return type** *list*

**get\_completed** (*platform=None*)

Returns a list of completed jobs

**Parameters** *platform* (*HPCPlatform*) – job platform

**Returns** completed jobs

**Return type** *list*

**get\_failed** (*platform=None*)

Returns a list of failed jobs

**Parameters** *platform* (*HPCPlatform*) – job platform

**Returns** failed jobs

**Return type** *list*

**get\_finished** (*platform=None*)

Returns a list of jobs finished (Completed, Failed)

**Parameters** *platform* (*HPCPlatform*) – job platform

**Returns** finished jobs

**Return type** *list*

**get\_in\_queue** (*platform=None*)

Returns a list of jobs in the platforms (Submitted, Running, Queuing)

**Parameters** *platform* (*HPCPlatform*) – job platform

**Returns** jobs in platforms

**Return type** list

**get\_job\_by\_name** (*name*)

Returns the job that its name matches parameter name

**Parameters** **name** (*str*) – name to look for

**Returns** found job

**Return type** job

**get\_job\_list** ()

Get inner job list

**Returns** job list

**Return type** list

**get\_not\_in\_queue** (*platform=None*)

Returns a list of jobs NOT in the platforms (Ready, Waiting)

**Parameters** **platform** (*HPCPlatform*) – job platform

**Returns** jobs not in platforms

**Return type** list

**get\_queuing** (*platform=None*)

Returns a list of jobs queuing

**Parameters** **platform** (*HPCPlatform*) – job platform

**Returns** queuedjobs

**Return type** list

**get\_ready** (*platform=None*)

Returns a list of ready jobs

**Parameters** **platform** (*HPCPlatform*) – job platform

**Returns** ready jobs

**Return type** list

**get\_running** (*platform=None*)

Returns a list of jobs running

**Parameters** **platform** (*HPCPlatform*) – job platform

**Returns** running jobs

**Return type** list

**get\_submitted** (*platform=None*)

Returns a list of submitted jobs

**Parameters** **platform** (*HPCPlatform*) – job platform

**Returns** submitted jobs

**Return type** list

**get\_unknown** (*platform=None*)

Returns a list of jobs on unknown state

**Parameters** **platform** (*HPCPlatform*) – job platform

**Returns** unknown state jobs

**Return type** list

**get\_waiting** (*platform=None*)

Returns a list of jobs waiting

**Parameters** **platform** (*HPCPlatform*) – job platform

**Returns** waiting jobs

**Return type** list

**load** ()

Recreates an stored joblist from the pickle file

**Returns** loaded joblist object

**Return type** JobList

**static load\_file** (*filename*)

Recreates an stored joblist from the pickle file

**Parameters** **filename** (*str*) – pickle file to load

**Returns** loaded joblist object

**Return type** JobList

**remove\_rerun\_only\_jobs** ()

Removes all jobs to be runned only in reruns

**rerun** (*chunk\_list*)

Updates joblist to rerun the jobs specified by chunk\_list

**Parameters** **chunk\_list** (*str*) – list of chunks to rerun

**Returns**

**save** ()

Stores joblist as a pickle file

**Returns** loaded joblist object

**Return type** JobList

**sort\_by\_id** ()

Returns a list of jobs sorted by id

**Returns** jobs sorted by ID

**Return type** list

**sort\_by\_name** ()

Returns a list of jobs sorted by name

**Returns** jobs sorted by name

**Return type** list

**sort\_by\_status** ()

Returns a list of jobs sorted by status

**Returns** job sorted by status

**Return type** list

**sort\_by\_type()**

Returns a list of jobs sorted by type

**Returns** job sorted by type

**Return type** list

**update\_genealogy()**

When we have created the joblist, every type of job is created. Update genealogy remove jobs that have no templates

**update\_shortened\_names()**

In some cases the scheduler only can operate with names shorter than 15 characters. Update the job list replacing job names by the corresponding shortened job name

## 7.7 autosubmit.monitor

**class** `autosubmit.monitor.monitor.Monitor`

Class to handle monitoring of Jobs at HPC.

**static clean\_plot** (*expid*)

Function to clean space on BasicConfig.LOCAL\_ROOT\_DIR/plot directory. Removes all plots except last two.

**Parameters** *expid* (*str*) – experiment’s identifier

**static clean\_stats** (*expid*)

Function to clean space on BasicConfig.LOCAL\_ROOT\_DIR/plot directory. Removes all stats’ plots except last two.

**Parameters** *expid* (*str*) – experiment’s identifier

**static color\_status** (*status*)

Return color associated to given status

**Parameters** *status* (*Status*) – status

**Returns** color

**Return type** str

**static create\_bar\_diagram** (*expid*, *joblist*, *output\_file*)

Function to plot statistics

**Parameters**

- *expid* (*str*) – experiment’s identifier
- *joblist* (*JobList*) – joblist to plot
- *output\_file* (*str*) – path to create file

**create\_tree\_list** (*expid*, *joblist*)

Create graph from joblist

**Parameters**

- *expid* (*str*) – experiment’s identifier
- *joblist* (*JobList*) – joblist to plot

**Returns** created graph

**Return type** pydotplus.Dot

**generate\_output** (*expid, joblist, output\_format='pdf'*)

Plots graph for joblist and stores it in a file

**Parameters**

- **expid** (*str*) – experiment’s identifier
- **joblist** (*JobList*) – joblist to plot
- **output\_format** (*str (png, pdf, ps)*) – file format for plot

**generate\_output\_stats** (*expid, joblist, output\_format='pdf'*)

Plots stats for joblist and stores it in a file

**Parameters**

- **expid** (*str*) – experiment’s identifier
- **joblist** (*JobList*) – joblist to plot
- **output\_format** (*str (png, pdf, ps)*) – file format for plot

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