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Hands-on Practice with FESOM 2

Briefing

Install FESOM and verify

Write our (very basic) first runscript

Check run and verify our settings.
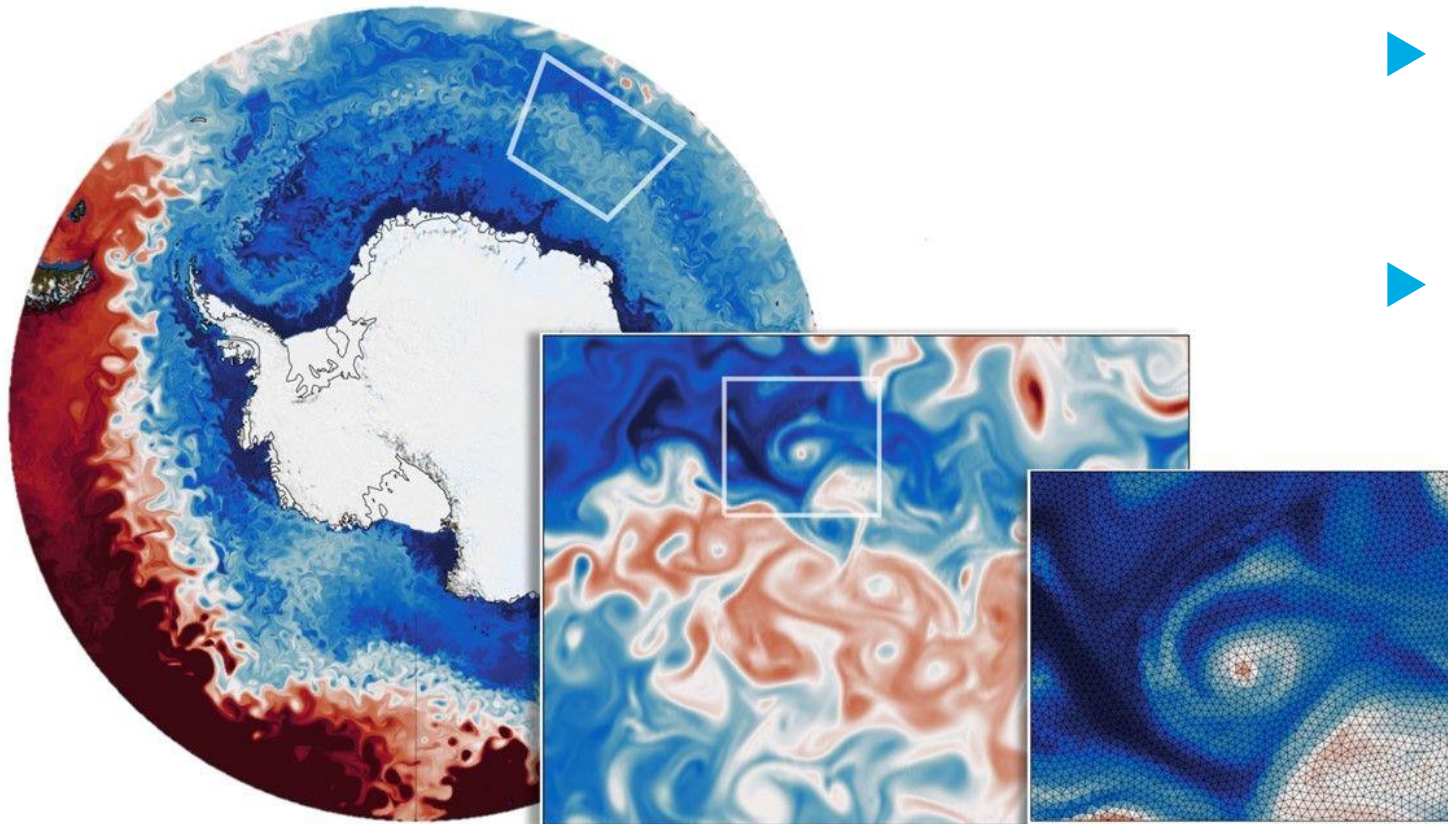
Submit our simulation (Mistral, Levante)

Monitor and check our simulation

⑤ Short Briefing

FESOM2
Finite volumE
Sea ice-Ocean Model

▶ **FESOM** (Finite-Element/volumE Sea ice-Ocean Model) is a multi-resolution sea ice-ocean model that solves the equations of motion on unstructured meshes.

▶ FESOM is developed and supported at the Alfred Wegener Institute, Helmholtz Centre for Polar and Marine Research (AWI).

▶ https://fesom.de/

▶ The **CORE II mesh** was initially used for experiments designed according to CORE II protocol. Later it become a basis mesh for climate simulations with **AWI-CM**. Mesh resolution increased in equatorial and polar regions.

⑤ Installing FESOM2 using ESM-Tools

```
mkdir Workshop

cd Workshop/

git clone https://github.com/esm-tools/workshops.git

mkdir model_codes   # models will be installed here

mkdir runscripts    # runscripts will be stored here


cd model_codes/

esm_master install-fesom-2.1 --check   # dryrun

esm_master install-fesom-2.1
```

TODO:

- install Fesom & verify

- check run

- explanation of directories

- run FESOM

- monitor run

- [HW] visualize output: pyfesom2

☞ Please don't install model codes or write runscripts inside the ESM-Tools repository.

General experiment folder

analysis/	bin/	config/	couple/	forcing/	input/	restart	run_DATE/	outdata/	unknown/

④ Folder Structure

General experiment folder

| analysis/ | bin/ | config/ | couple/ | forcing/ | input/ | restart | run_DATE/ | outdata/ | unknown/ |

Run folder

| analysis/ | bin/ | config/ | couple/ | work/ | input/ | restart/ | outdata/ | unknown/ | forcing/ |

④ Folder Structure

General experiment folder

analysis/	bin/	config/	couple/	forcing/	input/	restart	run_DATE/	outdata/	unknown/

Run folder

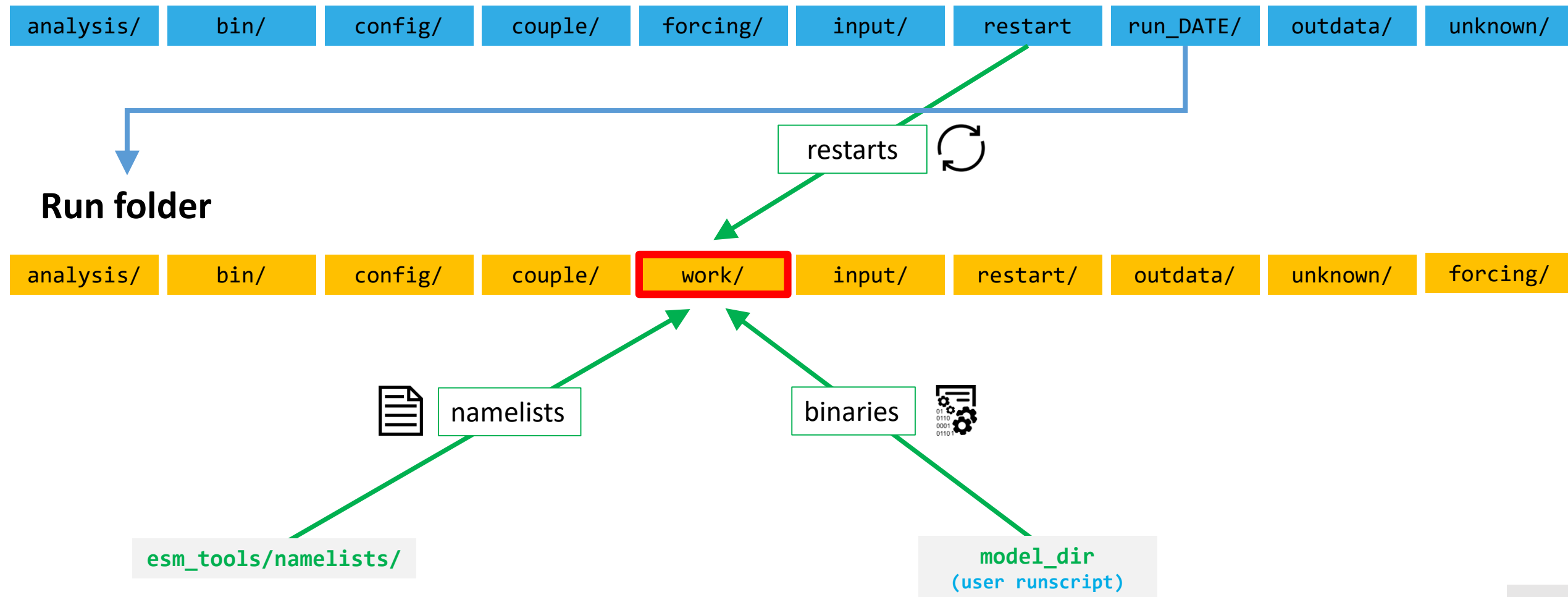| analysis/	bin/	config/	couple/	work/	input/	restart/	outdata/	unknown/	forcing/

`work/` **in the run folder:**
- ▶ Where the experiment run actually takes place.
- ▶ **Before the run:** Edited namelists, restart files and binaries are copied here before the run start.
- ▶ **During the run:** Output data and restarts are generated here by the model
- ▶ **After the run:** the output and restarts are copied to the general directory
- ▶ The copying of the files from work to the general directory is fully customizable using File Dictionaries
  https://esm-tools.readthedocs.io/en/latest/yaml.html#file-dictionaries)
- ▶ More details about the directory structure:
  https://esm-tools.readthedocs.io/en/latest/esm_runscripts.html#experiment-directory-structure

General experiment folder

| analysis/ | bin/ | config/ | couple/ | forcing/ | input/ | restart | run_DATE/ | outdata/ | unknown/ |

restarts ↻

Run folder

| analysis/ | bin/ | config/ | couple/ | **work/** | input/ | restart/ | outdata/ | unknown/ | forcing/ |

namelists

binaries

esm_tools/namelists/

model_dir
(user runscript)

④ Folder Structure

General experiment folder

| analysis/ | bin/ | config/ | couple/ | forcing/ | input/ | restart | run_DATE/ | outdata/ | unknown/ |

output data →

Run folder

🔁 restarts

| analysis/ | bin/ | config/ | couple/ | **work/** | input/ | restart/ | outdata/ | unknown/ | forcing/ |
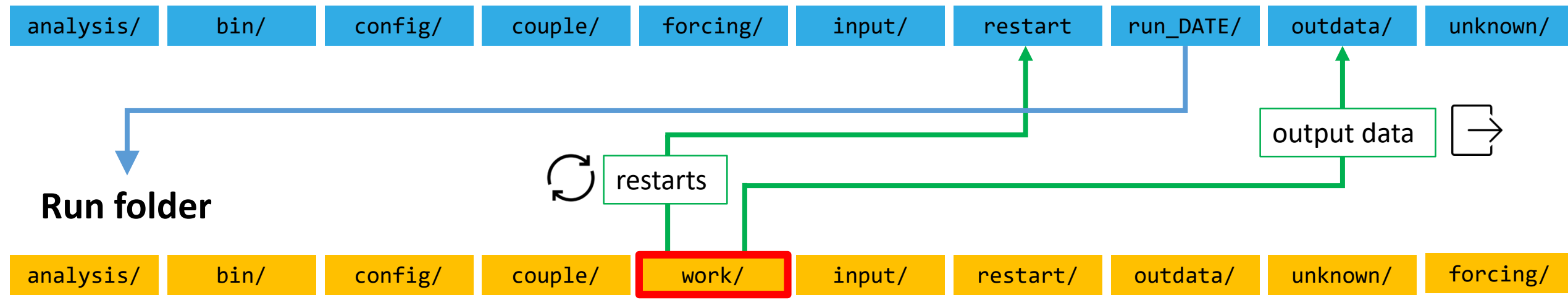
▶ Which files to be moved / copied are specified in YAML configuration files (eg. `model.yaml` or `setup.yaml`)

▶ The process is repeated for the next restart period (eg. `run_DATE-NEW`)

⑤ esm_runscripts: FESOM check run

Before we start:

▶ Make a **check run** and have a look at the **finished config** YAML file

```
esm_runscripts -e tutorial fesom_run_initial_monthly.yaml --check --verbose
```

▶ Verbose is optional but it gives you more output. It is better to redirect it to a file and view with a text editor

```
esm_runscripts -e tutorial fesom_run_initial_monthly.yaml --check –verbose &> check.log
```

☞ Don't forget to use `--open-run` if you don't have `use_venv: false` in your `general` section. Otherwise a dialog prompt will open

👉 **Exercise:** make a check run and look at the finished config file. Also observe directory structure

Now we can submit our run:

▶ Just drop the `--check`

```
esm_runscripts -e tutorial fesom_run_initial_monthly.yaml
```

▶ You can also use `--update` option to update the directory after the check run.

```
esm_runscripts -e tutorial fesom_run_initial_monthly.yaml --update
```

👉 **Exercise:** Submit and Monitor your run. Watch (`tail -f`) the log files in `exp_id/log/` director.y

```
[dural@ollie0  /work/ollie/dural/fesom_test/test/log]
$ ls
fesom                                          test_fesom_observe_compute_20000101-20000131.log
run_folders.log                                test_fesom_prepcompute_20000101-20000131.log
test_fesom_compute_14270806.log                test_fesom_prepcompute_20000201-20000229.log
test_fesom_compute_20000101-20000131_14270806.log  test_fesom_tidy_20000101-20000131.log
test_fesom.log
```