REANA & Compute4PUNCH
Status & Update

Manuel Giffels, 13.05.2024

What is REANA?

Reproducible research data analysis platform

Flexible

Run many computational workflow engines.

Scalable

Support for remote compute clouds.

Reusable

Containerise once, reuse elsewhere. Cloud-native.

Free

Free Software. MIT licence. Made with ❤ at CERN.
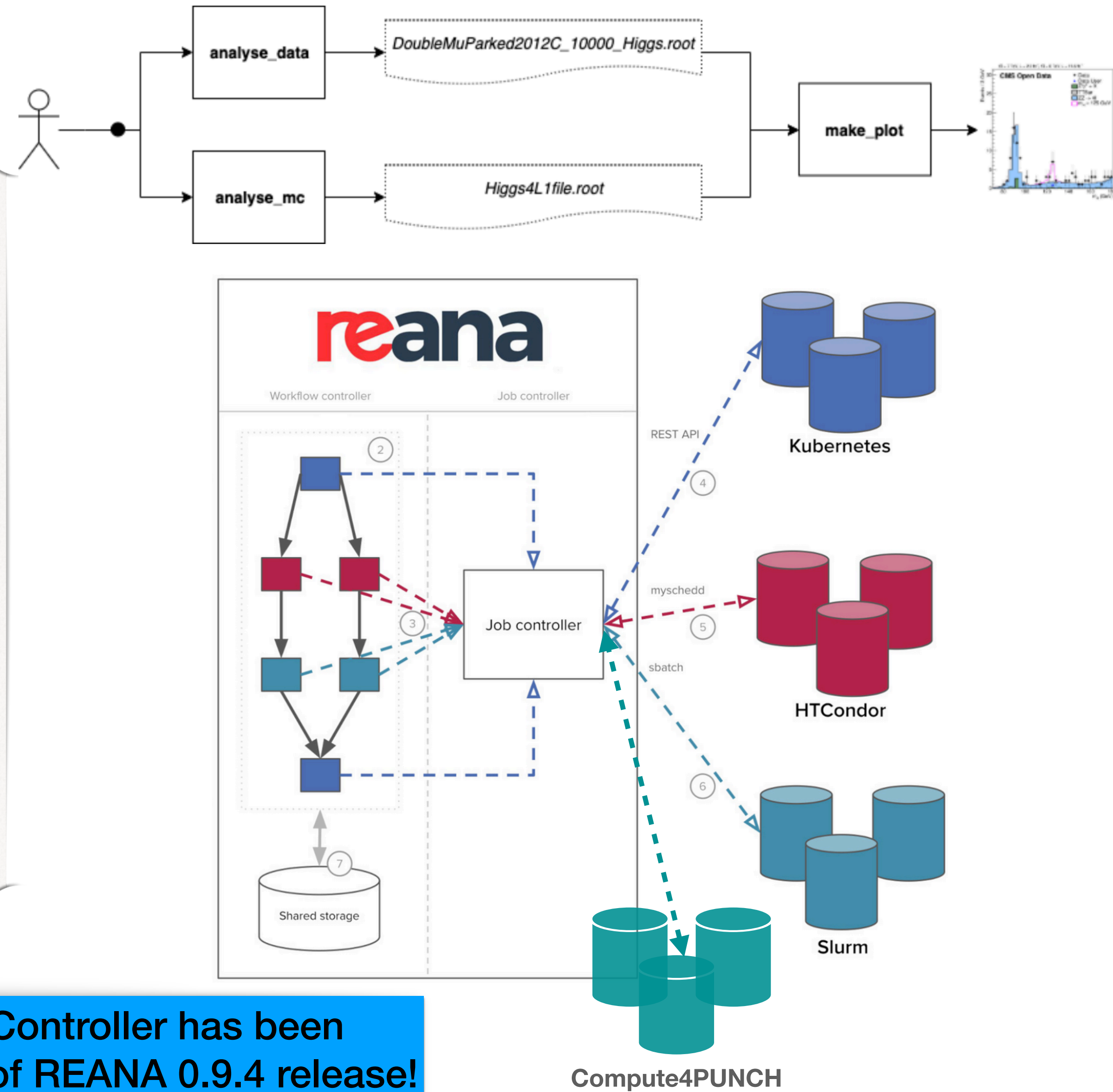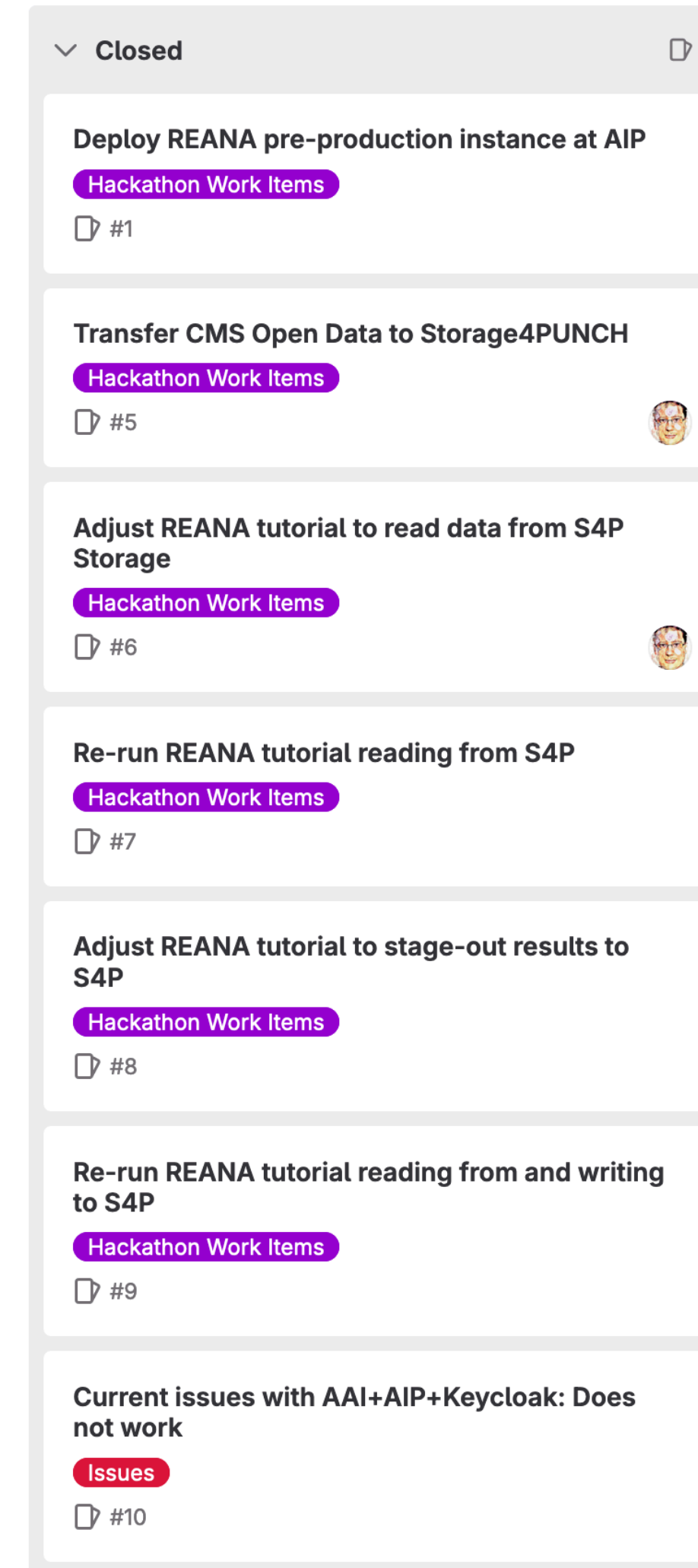
Compute4PUNCH Job Controller has been developed and will be part of REANA 0.9.4 release!

REANA4PUNCH - Hackathon Bonn

Integration of C4P, S4P and REANA

- **<u>Goal:</u>** Put all ingredients together C4P, S4P and REANA

- Deploy REANA development instance at AIP (including C4P Job Controller)

- Transfer CMS open data to S4P

- Run CMS Open Data Higgs tutorial on C4P reading from and writing to S4P

- After two days of collaborative work, we achieved our goal!

- Very successful event. Thanks to the colleagues from Bonn for organizing and hosting.

Link to GitLab Board

Browser address bar: https://reanadev.aip.de/profile | Suchen

reana

Your REANA token

In order to use your token, make sure you have reana-client installed and run:

```
$ export REANA_SERVER_URL=https://reanadev.aip.de
$ export REANA_ACCESS_TOKEN=
```

Your GitLab projects

Connect to GitLab

In order to integrate your GitLab projects with REANA you need to grant permissions.

Connect

Your quota

CPU — **0s** out of 1h — used 0%

Disk — **0 Bytes** out of 100 GiB — used 0%

Terminal:
```
Last login: Tue Apr 23 11:00:01 on ttys006
giffler  MacBook-Pro2023  ~  ssh -L 30443:127.0.0.1:30443 render.aip.de
Last login: Tue Apr 23 10:56:05 2024 from 129.13.101.141
(base) manuel@arm2armweb:~$
```

```
manuel_giffels@c4p-login:~ (ssh)
Last login: Tue Apr 23 11:01:06 on ttys008
giffler  MacBook-Pro2023  ~  venv mccli-env
giffler  MacBook-Pro2023  (e) mccli-env  ~  all_proxy=socks5://127.0.0.1:5055 mccli ssh c4p-lo
gin.gridka.de
Last login: Tue Apr 23 10:58:51 2024 from 131.220.249.86
This host is managed by Puppet.

Config Management Information
 Satellite Host: https://satellite.scc.kit.edu/hosts/c4p-login.gridka.de
 Hostgroup: PUNCH/login
 Puppet Environment: production
 Satellite Owner: Benoit Roland <benoit.roland@kit.edu>
 i-doit Host: Virtual machines are not registered in i-doit


This machine is a Compute4PUNCH login node. Have fun!

[manuel_giffels@c4p-login ~]$ condor_q


-- Schedd: c4p-login.gridka.de : <192.108.45.35:9618?... @ 04/23/24 11:02:44
OWNER BATCH_NAME      SUBMITTED   DONE   RUN    IDLE   HOLD  TOTAL JOB_IDS

Total for query: 0 jobs; 0 completed, 0 removed, 0 idle, 0 running, 0 held, 0 suspended
Total for manuel_giffels: 0 jobs; 0 completed, 0 removed, 0 idle, 0 running, 0 held, 0 suspended
Total for all users: 3 jobs; 0 completed, 0 removed, 0 idle, 0 running, 3 held, 0 suspended
```

https://reanadev.aip.de/profile

Suchen

reana

Your REANA token

In order to use your token, make sure you have reana-client installed and run:

```
$ export REANA_SERVER_URL=https://reanadev.aip.de

$ export REANA_ACCESS_TOKEN=▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓
```

Your GitLab projects

Connect to GitLab

In order to integrate your GitLab projects with REANA you need to grant permissions.

🦊 Connect

Your quota

0s
out of 1h
CPU
used 0%

0 Bytes
out of 100 GiB
Disk
used 0%

📄 Docs   💬 Forum   🩺 Cluster health

MacBook-Pro2023.local

30443:127.0.0.1:30443 (ssh)

9b761fb1-9ab5-4d46-88e5-86195aaca4cc: command not found
(venv-reana) (base) manuel@arm2armweb:~$ export REANA_SERVER_URL=https://reanadev.aip.de
export REANA_ACCESS_TOKEN=
(venv-reana) (base) manuel@arm2armweb:~$ reana-client secrets-add --env HEL
MHOLTZ_TOP=eyJhbGciOiJFUzUxMiIsInR5cCI6Ik1UK0pXVCJ9.eyJ2ZXIiOiIwLjYiLCJ0b2t
lbl90eXBlIjoibXl0b2tlbiIsImlzcyI6Imh0dHBzOi8vbXl0b2tlbi5hYXRhLmtpdC5lZHUvIi
wic3ViIjoiOFVWNC9RRN3RIN3RCVFprbnhSNjNRaGVVVGxjSHRqektIYWxjaGRTQUFYYz0iLCJzZ
XFfbm8iOjEsImF1ZCI6Imh0dHBzOi8vbXl0b2tlbi5kYXRhLmtpdC5lZHUvIiwib2lkY19zdWI
OiJmZGM5MGRlYy1kNGEwLTRhNTAtYjI3Ny0zMTRlM2ZmMjY5MzYiLCJvaWRjX2lzcyI6Imh0dHB
zOi8vbG9naW4uaGVsbWhvbHR6LmRlL29hdXRoMiIsImNhGFiWxpdGllcyI6WyJBVCIsInRva2
VuaW5mbyJdLCJleHAiOjE3MTQzNzkzNzAsIm5iZiI6MTcxMzc3Njg5NiwiaWF0IjoxNzEzNzc20
Dk2LCJhdXRoX3RpbWUiOjE3MTM3NzY4OTYsImp0aSI6IjVkMzExMDYwLTAwZjYtNDc1OS04MjU1
LTZhNWY3ZTA3ZDRjNCIsInJlc3RyaWN0aW9ucyI6W3siZXhwIjoxNzE0Mzc5MzcwfV19.ANjoJ5
V-e4KJh3EpAJlWvcogcLnSfx68KMRsTG-UTpfbAcJf_EH4c4zzxX91C6_p4zAFLYUsIEqkozmTG
XhXAncqAestIIP9ij2u_wbotAlmBElKizwy_JPP5qL23-Up-pwYTRNALCj2env24uO-v5IR9CPu
4gxzqNn42bsPr2TwkoDX
==> SUCCESS: Secrets HELMHOLTZ_TOP were successfully uploaded.
(venv-reana) (base) manuel@arm2armweb:~$ reana-client secrets-list
NAME   TYPE
HELMHOLTZ_TOP   env
(venv-reana) (base) manuel@arm2armweb:~$

---

manuel_giffels@c4p-login:~ (ssh)

[manuel_giffels@c4p-login ~]$

reana

⟳ **reana-cern-open-data-tutorial** #1
Started 7 minutes ago

running for 6 min 45 sec
step 1/3

⚙ Engine logs   >_ **Job logs**   📁 Workspace   📄 Specification

| Step | plots ▾ | **running** for 30 seconds | ☁ compute4punch | 🍴 wlcg-... | $ source /cvmfs/sft.cern.ch/lcg/views/... |

📖 Docs   💬 Forum   💗 Cluster health

MacBook-Pro2023.local

30443:127.0.0.1:30443 (ssh)

```
==> Verifying REANA specification file... /home/manuel/reana-cern-open-data
-tutorial/reana.yaml
   -> SUCCESS: Valid REANA specification file.
==> Verifying REANA specification parameters...
   -> SUCCESS: REANA specification parameters appear valid.
==> Verifying workflow parameters and commands...
   -> SUCCESS: Workflow parameters and commands appear valid.
==> Verifying dangerous workflow operations...
   -> SUCCESS: Workflow operations appear valid.
==> Verifying compute backends in REANA specification file...
   -> SUCCESS: Workflow compute backends appear to be valid.
reana-cern-open-data-tutorial.1
==> SUCCESS: File /reana.yaml was successfully uploaded.
==> Uploading files...
==> Detected .gitignore file. Some files might get ignored.
==> SUCCESS: File /code/df103_NanoAODHiggsAnalysis.C was successfully uploa
ded.
==> SUCCESS: File /code/stage_out.sh was successfully uploaded.
==> SUCCESS: File /code/PrintHistos.C was successfully uploaded.
==> Starting workflow...
==> SUCCESS: reana-cern-open-data-tutorial.1 has been queued
(venv-reana) (base) manuel@arm2armweb:~/reana-cern-open-data-tutorial$
```

manuel_giffels@c4p-login:~ (ssh)

```
Singularity> tail -f _condor_stdout
   | Welcome to ROOT 6.30/02                    https://root.cern |
   | (c) 1995-2023, The ROOT Team; conception: R. Brun, F. Rademakers |
   | Built for linuxx8664gcc on Dec 20 2023, 18:55:48            |
   | From heads/master@tags/v6-30-02                             |
   | With g++ (GCC) 12.1.0                                       |
   | Try '.help'/'.?', '.demo', '.license', '.credits', '.quit'/'.q' |
   ------------------------------------------------------------------


Processing code/df103_NanoAODHiggsAnalysis.C+...
read returned, exiting
Connection to condor-job.wwu-os-38ddb54312.local.os.wwu.de closed.
[manuel_giffels@c4p-login ~]$ condor_q


-- Schedd: c4p-login.gridka.de : <192.108.45.35:9618?... @ 04/23/24 12:10:07
OWNER          BATCH_NAME      SUBMITTED   DONE   RUN    IDLE  TOTAL JOB_IDS
manuel_giffels ID: 159    4/23 12:09      _      1      _      1 159.0

Total for query: 1 jobs; 0 completed, 0 removed, 0 idle, 1 running, 0 held, 0 suspended
Total for manuel_giffels: 1 jobs; 0 completed, 0 removed, 0 idle, 1 running, 0 held, 0 suspend
ed
Total for all users: 1 jobs; 0 completed, 0 removed, 0 idle, 1 running, 0 held, 0 suspended

[manuel_giffels@c4p-login ~]$
```

Browser (left side):

reana-cern-open-data-tutorial

https://reanadev.aip.de/details/671e9d71-070d-42...

Suchen

reana

✓ reana-cern-open-data-tutorial #1
Finished a few seconds ago

finished in 10 min 17 sec
step 3/3

⚙ Engine logs   >_ Job logs   📁 Workspace   📄 Specification

Search...

Name	Modified	Size
reana.yaml	2024-04-23T10:09:34	1.2 KiB
.root_hist	2024-04-23T10:09:34	38 Bytes
code/df103_NanoAODHiggsAnalysis.C	2024-04-23T10:09:34	22.85 KiB
code/stage_out.sh	2024-04-23T10:09:34	316 Bytes
code/PrintHistos.C	2024-04-23T10:09:34	415 Bytes
code/df103_NanoAODHiggsAnalysis.C.d	2024-04-23T10:09:34	32.77 KiB
code/df103_NanoAODHiggsAnalysis_C_...	2024-04-23T10:09:34	1.14 KiB
code/df103_NanoAODHiggsAnalysis_C.so	2024-04-23T10:09:34	444.23 KiB
logs/158.0.err	2024-04-23T10:09:33	615 Bytes
logs/158.0.out	2024-04-23T10:09:33	617 Bytes
results/higgs_4l.root	2024-04-23T10:09:35	9.59 KiB
results/higgs_4mu.root	2024-04-23T10:09:35	9.42 KiB
results/higgs_2el2mu.root	2024-04-23T10:09:35	9.54 KiB
results/higgs_4el.root	2024-04-23T10:09:35	9.49 KiB
.condor_creds/helmholtz.use	2024-04-23T10:09:35	968 Bytes

📄 Docs   💬 Forum   💗 Cluster health

Terminal (right side, top):

MacBook-Pro2023.local
30443:127.0.0.1:30443 (ssh)

==> Verifying REANA specification file... /home/manuel/reana-cern-open-data
-tutorial/reana.yaml
    -> SUCCESS: Valid REANA specification file.
==> Verifying REANA specification parameters...
    -> SUCCESS: REANA specification parameters appear valid.
==> Verifying workflow parameters and commands...
    -> SUCCESS: Workflow parameters and commands appear valid.
==> Verifying dangerous workflow operations...
    -> SUCCESS: Workflow operations appear valid.
==> Verifying compute backends in REANA specification file...
    -> SUCCESS: Workflow compute backends appear to be valid.
reana-cern-open-data-tutorial.1
==> SUCCESS: File /reana.yaml was successfully uploaded.
==> Uploading files...
==> Detected .gitignore file. Some files might get ignored.
==> SUCCESS: File /code/df103_NanoAODHiggsAnalysis.C was successfully uploa
ded.
==> SUCCESS: File /code/stage_out.sh was successfully uploaded.
==> SUCCESS: File /code/PrintHistos.C was successfully uploaded.
==> Starting workflow...
==> SUCCESS: reana-cern-open-data-tutorial.1 has been queued
(venv-reana) (base) manuel@arm2armweb:~/reana-cern-open-data-tutorial$

Terminal (right side, bottom):

manuel_giffels@c4p-login:~ (ssh)

Singularity> tail -f _condor_stdout
    | Welcome to ROOT 6.30/02   https://root.cern |
    | (c) 1995-2023, The ROOT Team; conception: R. Brun, F. Rademakers |
    | Built for linuxx8664gcc on Dec 20 2023, 18:55:48 |
    | From heads/master@tags/v6-30-02 |
    | With g++ (GCC) 12.1.0 |
    | Try '.help'/'.?', '.demo', '.license', '.credits', '.quit'/'.q' |

Processing code/df103_NanoAODHiggsAnalysis.C+...
read returned, exiting
Connection to condor-job.wwu-os-38ddb54312.local.os.wwu.de closed.
[manuel_giffels@c4p-login ~]$ condor_q

-- Schedd: c4p-login.gridka.de : <192.108.45.35:9618?... @ 04/23/24 12:10:07
OWNER   BATCH_NAME   SUBMITTED   DONE   RUN   IDLE TOTAL JOB_IDS
manuel_giffels ID: 159   4/23 12:09   _   1   _   1 159.0

Total for query: 1 jobs; 0 completed, 0 removed, 0 idle, 1 running, 0 held, 0 suspended
Total for manuel_giffels: 1 jobs; 0 completed, 0 removed, 0 idle, 1 running, 0 held, 0 suspend
ed
Total for all users: 1 jobs; 0 completed, 0 removed, 0 idle, 1 running, 0 held, 0 suspended

[manuel_giffels@c4p-login ~]$

⟨ ⟩ ⟳   https://reanadev.aip.de/details/671e9d71-070d-42   🔍 Suchen

reana

✓ **reana-cern-open-data-tutorial** #1   **finished** in 10 min 17 sec
Finished a few seconds ago   step 3/3

⚙ Engine logs   >_ **Job logs**   📁 Workspace   📄 Specification

Step | stage_out ▾ | **finished** in 1 min 54 sec   ☁ compute4punch   🗔 wlcg-wn... $ chmod +x code/stage_out.sh && co...

Copying 16177 bytes file:///srv/results/higgs_2el2mu.pdf => https://dcache-desy-webdav.desy.de:2880//pnfs/

desy.de/punch/tutorials/reana-cern-open-data-tutorial/671e9d71-070d-4207-bc5b-7b9aa2e55664/higgs_2el2mu.pdf

event: [1713867114632] BOTH   GFAL2:CORE:COPY   LIST:ENTER

event: [1713867114632] BOTH   GFAL2:CORE:COPY   LIST:ITEM   file:///srv/results/higgs_2el2mu.pdf =>

https://dcache-desy-webdav.desy.de:2880//pnfs/desy.de/punch/tutorials/reana-cern-open-data-tutorial/

671e9d71-070d-4207-bc5b-7b9aa2e55664/higgs_2el2mu.pdf

event: [1713867114632] BOTH   GFAL2:CORE:COPY   LIST:EXIT

event: [1713867114632] BOTH   http_plugin   PREPARE:ENTER   file:///srv/results/higgs_2el2mu.pdf =>

https://dcache-desy-webdav.desy.de:2880//pnfs/desy.de/punch/tutorials/reana-cern-open-data-tutorial/

671e9d71-070d-4207-bc5b-7b9aa2e55664/higgs_2el2mu.pdf

event: [1713867114754] BOTH   http_plugin   PREPARE:EXIT   file:///srv/results/higgs_2el2mu.pdf =>

https://dcache-desy-webdav.desy.de:2880//pnfs/desy.de/punch/tutorials/reana-cern-open-data-tutorial/

671e9d71-070d-4207-bc5b-7b9aa2e55664/higgs_2el2mu.pdf

event: [1713867114754] BOTH   http_plugin   TRANSFER:ENTER   file:///srv/results/higgs_2el2mu.pdf =>

https://dcache-desy-webdav.desy.de:2880//pnfs/desy.de/punch/tutorials/reana-cern-open-data-tutorial/

671e9d71-070d-4207-bc5b-7b9aa2e55664/higgs_2el2mu.pdf

event: [1713867114755] BOTH   http_plugin   TRANSFER:TYPE   streamed

event: [1713867115034] BOTH   http_plugin   TRANSFER:EXIT   file:///srv/results/higgs_2el2mu.pdf =>

https://dcache-desy-webdav.desy.de:2880//pnfs/desy.de/punch/tutorials/reana-cern-open-data-tutorial/

📄 Docs   💬 Forum   💚 Cluster health

● MacBook-Pro2023.local
● 30443:127.0.0.1:30443 (ssh)

```
==> Verifying REANA specification file... /home/manuel/reana-cern-open-data
-tutorial/reana.yaml
   -> SUCCESS: Valid REANA specification file.
==> Verifying REANA specification parameters...
   -> SUCCESS: REANA specification parameters appear valid.
==> Verifying workflow parameters and commands...
   -> SUCCESS: Workflow parameters and commands appear valid.
==> Verifying dangerous workflow operations...
   -> SUCCESS: Workflow operations appear valid.
==> Verifying compute backends in REANA specification file...
   -> SUCCESS: Workflow compute backends appear to be valid.
reana-cern-open-data-tutorial.1
==> SUCCESS: File /reana.yaml was successfully uploaded.
==> Uploading files...
==> Detected .gitignore file. Some files might get ignored.
==> SUCCESS: File /code/df103_NanoAODHiggsAnalysis.C was successfully uploa
ded.
==> SUCCESS: File /code/stage_out.sh was successfully uploaded.
==> SUCCESS: File /code/PrintHistos.C was successfully uploaded.
==> Starting workflow...
==> SUCCESS: reana-cern-open-data-tutorial.1 has been queued
(venv-reana) (base) manuel@arm2armweb:~/reana-cern-open-data-tutorial$ 
```

● manuel_giffels@c4p-login:~ (ssh)

```
Singularity> tail -f _condor_stdout
 |  Welcome to ROOT 6.30/02                      https://root.cern |
 |  (c) 1995-2023, The ROOT Team; conception: R. Brun, F. Rademakers |
 |  Built for linuxx8664gcc on Dec 20 2023, 18:55:48      |
 |  From heads/master@tags/v6-30-02                        |
 |  With g++ (GCC) 12.1.0                                  |
 |  Try '.help'/'.?', '.demo', '.license', '.credits', '.quit'/'.q' |
 ------------------------------------------------------------


Processing code/df103_NanoAODHiggsAnalysis.C+...
read returned, exiting
Connection to condor-job.wwu-os-38ddb54312.local.os.wwu.de closed.
[manuel_giffels@c4p-login ~]$ condor_q


-- Schedd: c4p-login.gridka.de : <192.108.45.35:9618?... @ 04/23/24 12:10:07
OWNER          BATCH_NAME    SUBMITTED   DONE  RUN    IDLE  TOTAL JOB_IDS
manuel_giffels ID: 159       4/23 12:09    _     1      _       1 159.0

Total for query: 1 jobs; 0 completed, 0 removed, 0 idle, 1 running, 0 held, 0 suspended
Total for manuel_giffels: 1 jobs; 0 completed, 0 removed, 0 idle, 1 running, 0 held, 0 suspend
ed
Total for all users: 1 jobs; 0 completed, 0 removed, 0 idle, 1 running, 0 held, 0 suspended


[manuel_giffels@c4p-login ~]$ 
```

Browser window (REANA):

reana-cern-open-data-tutorial https://reanadev.aip.de/details/671e9d71-070d-42...

reana

✓ reana-cern-open-data-tutorial #1
Finished a few seconds ago

finished in 10 min 17 sec
step 3/3

⚙ Engine logs >_ Job logs 📁 Workspace 📄 Specification

Step [stage_out ▾] **finished** in 1 min 54 sec ☁ compute4punch 🖥 wlcg-wn... $ chmod +x code/stage_out.sh && co...

```
Copying 9764 bytes file:///srv/results/higgs_2el2mu.root => https://dcache-desy-webdav.desy.de:2880//pnfs/
desy.de/punch/tutorials/reana-cern-open-data-tutorial/671e9d71-070d-4207-bc5b-7b9aa2e55664/
higgs_2el2mu.root

event: [1713867115578] BOTH   GFAL2:CORE:COPY   LIST:ENTER
event: [1713867115579] BOTH   GFAL2:CORE:COPY   LIST:ITEM       file:///srv/results/higgs_2el2mu.root =>
https://dcache-desy-webdav.desy.de:2880/pnfs/desy.de/punch/tutorials/reana-cern-open-data-tutorial/
671e9d71-070d-4207-bc5b-7b9aa2e55664/higgs_2el2mu.root
event: [1713867115579] BOTH   GFAL2:CORE:COPY   LIST:EXIT
event: [1713867115579] BOTH   http_plugin       PREPARE:ENTER   file:///srv/results/higgs_2el2mu.root =>
https://dcache-desy-webdav.desy.de:2880/pnfs/desy.de/punch/tutorials/reana-cern-open-data-tutorial/
671e9d71-070d-4207-bc5b-7b9aa2e55664/higgs_2el2mu.root
event: [1713867115647] BOTH   http_plugin       PREPARE:EXIT    file:///srv/results/higgs_2el2mu.root =>
https://dcache-desy-webdav.desy.de:2880/pnfs/desy.de/punch/tutorials/reana-cern-open-data-tutorial/
671e9d71-070d-4207-bc5b-7b9aa2e55664/higgs_2el2mu.root
event: [1713867115647] BOTH   http_plugin       TRANSFER:ENTER  file:///srv/results/higgs_2el2mu.root =>
https://dcache-desy-webdav.desy.de:2880/pnfs/desy.de/punch/tutorials/reana-cern-open-data-tutorial/
671e9d71-070d-4207-bc5b-7b9aa2e55664/higgs_2el2mu.root
event: [1713867115647] BOTH   http_plugin       TRANSFER:TYPE   streamed
event: [1713867115864] BOTH   http_plugin       TRANSFER:EXIT   file:///srv/results/higgs_2el2mu.root =>
```

📖 Docs 💬 Forum ❤ Cluster health

Terminal window (MacBook-Pro2023.local):

```
==> Verifying REANA specification file... /home/manuel/reana-cern-open-data
-tutorial/reana.yaml
   -> SUCCESS: Valid REANA specification file.
==> Verifying REANA specification parameters...
   -> SUCCESS: REANA specification parameters appear valid.
==> Verifying workflow parameters and commands...
   -> SUCCESS: Workflow parameters and commands appear valid.
==> Verifying dangerous workflow operations...
   -> SUCCESS: Workflow operations appear valid.
==> Verifying compute backends in REANA specification file...
   -> SUCCESS: Workflow compute backends appear to be valid.
reana-cern-open-data-tutorial.1
==> SUCCESS: File /reana.yaml was successfully uploaded.
==> Uploading files...
==> Detected .gitignore file. Some files might get ignored.
==> SUCCESS: File /code/df103_NanoAODHiggsAnalysis.C was successfully uploa
ded.
==> SUCCESS: File /code/stage_out.sh was successfully uploaded.
==> SUCCESS: File /code/PrintHistos.C was successfully uploaded.
==> Starting workflow...
==> SUCCESS: reana-cern-open-data-tutorial.1 has been queued
(venv-reana) (base) manuel@arm2armweb:~/reana-cern-open-data-tutorial$

-- Schedd: c4p-login.gridka.de : <192.108.45.35:9618?... @ 04/23/24 12:10:07
OWNER          BATCH_NAME    SUBMITTED   DONE   RUN    IDLE   TOTAL JOB_IDS
manuel_giffels ID: 159       4/23 12:09    _      1      _        1 159.0

Total for query: 1 jobs; 0 completed, 0 removed, 0 idle, 1 running, 0 held, 0 suspended
Total for manuel_giffels: 1 jobs; 0 completed, 0 removed, 0 idle, 1 running, 0 held, 0 suspend
ed
Total for all users: 1 jobs; 0 completed, 0 removed, 0 idle, 1 running, 0 held, 0 suspended

[manuel_giffels@c4p-login ~]$ Abgemeldet
Connection to c4p-login.gridka.de closed.
giffler ⌚ MacBook-Pro2023 (e) mccli-env ~  davix-ls --capath /etc/grid-security/certif
icates -l -H "Authorization: Bearer $(oidc-token punch-aai)" https://dcache-desy-webdav.desy.d
e:2880//pnfs/desy.de/punch/tutorials/reana-cern-open-data-tutorial/671e9d71-070d-4207-bc5b-7b9
aa2e55664
-rwxrwxrwx 0     16177     2024-04-23 12:11:55 higgs_2el2mu.pdf
-rwxrwxrwx 0     9764      2024-04-23 12:11:55 higgs_2el2mu.root
-rwxrwxrwx 0     15531     2024-04-23 12:11:56 higgs_4el.pdf
-rwxrwxrwx 0     9716      2024-04-23 12:11:57 higgs_4el.root
-rwxrwxrwx 0     17292     2024-04-23 12:11:58 higgs_4l.pdf
-rwxrwxrwx 0     9816      2024-04-23 12:11:59 higgs_4l.root
-rwxrwxrwx 0     16109     2024-04-23 12:12:00 higgs_4mu.pdf
-rwxrwxrwx 0     9649      2024-04-23 12:12:00 higgs_4mu.root
giffler ⌚ MacBook-Pro2023 (e) mccli-env ~
```

reana-cern-open-data-tutorial

https://reanadev.aip.de/details/671e9d71-070d-42...

Suchen

reana

results/higgs_4l.pdf

1 von 1   Automatischer Zoom

▼ Contents
   Page 1

CMS Open Data

$\sqrt{s} = 8$ TeV, $L_{int} = 11.6$ fb^{-1}

- Data
- ZZ
- $m_H = 125$ GeV

N_{Events}

m_{4l} (GeV)

Download

Docs   Forum   Cluster health

MacBook-Pro2023.local

30443:127.0.0.1:30443 (ssh)

```
==> Verifying REANA specification file... /home/manuel/reana-cern-open-data
-tutorial/reana.yaml
   -> SUCCESS: Valid REANA specification file.
==> Verifying REANA specification parameters...
   -> SUCCESS: REANA specification parameters appear valid.
==> Verifying workflow parameters and commands...
   -> SUCCESS: Workflow parameters and commands appear valid.
==> Verifying dangerous workflow operations...
   -> SUCCESS: Workflow operations appear valid.
==> Verifying compute backends in REANA specification file...
   -> SUCCESS: Workflow compute backends appear to be valid.
reana-cern-open-data-tutorial.1
==> SUCCESS: File /reana.yaml was successfully uploaded.
==> Uploading files...
==> Detected .gitignore file. Some files might get ignored.
==> SUCCESS: File /code/df103_NanoAODHiggsAnalysis.C was successfully uploa
ded.
==> SUCCESS: File /code/stage_out.sh was successfully uploaded.
==> SUCCESS: File /code/PrintHistos.C was successfully uploaded.
==> Starting workflow...
==> SUCCESS: reana-cern-open-data-tutorial.1 has been queued
(venv-reana) (base) manuel@arm2armweb:~/reana-cern-open-data-tutorial$ 
```

~ (-zsh)

```
-- Schedd: c4p-login.gridka.de : <192.108.45.35:9618?... @ 04/23/24 12:10:07
OWNER           BATCH_NAME      SUBMITTED   DONE    RUN    IDLE   TOTAL JOB_IDS
manuel_giffels  ID: 159         4/23 12:09    _      1      _       1 159.0

Total for query: 1 jobs; 0 completed, 0 removed, 0 idle, 1 running, 0 held, 0 suspended
Total for manuel_giffels: 1 jobs; 0 completed, 0 removed, 0 idle, 1 running, 0 held, 0 suspend
ed
Total for all users: 1 jobs; 0 completed, 0 removed, 0 idle, 1 running, 0 held, 0 suspended


[manuel_giffels@c4p-login ~]$ Abgemeldet
Connection to c4p-login.gridka.de closed.
giffler   MacBook-Pro2023  (e) mccli-env  ~  davix-ls --capath /etc/grid-security/certif
icates -l -H "Authorization: Bearer $(oidc-token punch-aai)" https://dcache-desy-webdav.desy.d
e:2880//pnfs/desy.de/punch/tutorials/reana-cern-open-data-tutorial/671e9d71-070d-4207-bc5b-7b9
aa2e55664
-rwxrwxrwx 0    16177    2024-04-23 12:11:55 higgs_2el2mu.pdf
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-rwxrwxrwx 0     9716    2024-04-23 12:11:57 higgs_4el.root
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-rwxrwxrwx 0     9816    2024-04-23 12:11:59 higgs_4l.root
-rwxrwxrwx 0    16109    2024-04-23 12:12:00 higgs_4mu.pdf
-rwxrwxrwx 0     9649    2024-04-23 12:12:00 higgs_4mu.root
giffler   MacBook-Pro2023  (e) mccli-env  ~ 
```

```cpp
      legend.SetBorderSize(0);
      legend.SetTextSize(0.03);
      legend.AddEntry(&h_data, "Data", "PE1");
      legend.AddEntry(&h_bkg, "ZZ", "f");
      legend.AddEntry(&h_cmb, "m_{H} = 125 GeV", "f");
      legend.DrawClone();

   // Add header
   TLatex cms_label;
   cms_label.SetTextSize(0.04);
   cms_label.DrawLatexNDC(0.16, 0.92, "#bf{CMS Open Data}");
   TLatex header;
   header.SetTextSize(0.03);
   header.DrawLatexNDC(0.63, 0.92, "#sqrt{s} = 8 TeV, L_{int} = 11.6 fb^{-1}");

   // Save plot
   auto output = std::string{"results/"} + filename;
   c->SaveAs(output.c_str());
}

void df103_NanoAODHiggsAnalysis(const bool run_fast = false)
{
   // Enable multi-threading
   ROOT::EnableImplicitMT();

   // In fast mode, take samples from */cms_opendata_2012_nanoaod_skimmed/*, which has
   // the preselections from the selection_* functions already applied.
   //std::string path = "root://eospublic.cern.ch//eos/root-eos/cms_opendata_2012_nanoaod/";
   //if (run_fast) path = "root://eospublic.cern.ch//eos/root-eos/cms_opendata_2012_nanoaod_skimmed/"
;
   std::string path = "root://dcachewebdav-kit.gridka.de/pnfs/gridka.de/punch4nfdi/cms_opendata_2012_
nanoaod/";
   if (run_fast) path = "root://dcachewebdav-kit.gridka.de/pnfs/gridka.de/punch4nfdi/cms_opendata_201
2_nanoaod_skimmed/";

   // Create dataframes for signal, background and data samples

   // Signal: Higgs -> 4 leptons
   ROOT::RDataFrame df_sig_4l("Events", path + "SMHiggsToZZTo4L.root");

   // Background: ZZ -> 4 leptons
   // Note that additional background processes from the original paper with minor contribution were
left out for this
   // tutorial.
   ROOT::RDataFrame df_bkg_4mu("Events", path + "ZZTo4mu.root");
   ROOT::RDataFrame df_bkg_4el("Events", path + "ZZTo4e.root");
   ROOT::RDataFrame df_bkg_2el2mu("Events", path + "ZZTo2e2mu.root");

   // CMS data taken in 2012 (11.6 fb^-1 integrated luminosity)
   ROOT::RDataFrame df_data_doublemu(
      "Events", {path + "Run2012B_DoubleMuParked.root", path + "Run2012C_DoubleMuParked.root"});
   ROOT::RDataFrame df_data_doubleel(
      "Events", {path + "Run2012B_DoubleElectron.root", path + "Run2012C_DoubleElectron.root"});

   // Reconstruct Higgs to 4 muons
   auto df_sig_4mu_reco = reco_higgs_to_4mu(df_sig_4l);
```

```
MacBook-Pro2023.local

30443:127.0.0.1:30443 (ssh)

==> Verifying REANA specification file... /home/manuel/reana-cern-open-data
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(venv-reana) (base) manuel@arm2armweb:~/reana-cern-open-data-tutorial$

~ (-zsh)

-- Schedd: c4p-login.gridka.de : <192.108.45.35:9618?... @ 04/23/24 12:10:07
OWNER           BATCH_NAME    SUBMITTED    DONE   RUN    IDLE  TOTAL JOB_IDS
manuel_giffels ID: 159    4/23 12:09     _      1      _      1 159.0

Total for query: 1 jobs; 0 completed, 0 removed, 0 idle, 1 running, 0 held, 0 suspended
Total for manuel_giffels: 1 jobs; 0 completed, 0 removed, 0 idle, 1 running, 0 held, 0 suspend
ed
Total for all users: 1 jobs; 0 completed, 0 removed, 0 idle, 1 running, 0 held, 0 suspended

[manuel_giffels@c4p-login ~]$ Abgemeldet
Connection to c4p-login.gridka.de closed.
giffler  MacBook-Pro2023  (e) mccli-env  ~  davix-ls --capath /etc/grid-security/certif
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e:2880/pnfs/desy.de/punch/tutorials/reana-cern-open-data-tutorial/671e9d71-070d-4207-bc5b-7b9
aa2e55664
-rwxrwxrwx 0    16177    2024-04-23 12:11:55 higgs_2el2mu.pdf
-rwxrwxrwx 0    9764     2024-04-23 12:11:55 higgs_2el2mu.root
-rwxrwxrwx 0    15531    2024-04-23 12:11:56 higgs_4el.pdf
-rwxrwxrwx 0    9716     2024-04-23 12:11:57 higgs_4el.root
-rwxrwxrwx 0    17292    2024-04-23 12:11:58 higgs_4l.pdf
-rwxrwxrwx 0    9816     2024-04-23 12:11:59 higgs_4l.root
-rwxrwxrwx 0    16109    2024-04-23 12:12:00 higgs_4mu.pdf
-rwxrwxrwx 0    9649     2024-04-23 12:12:00 higgs_4mu.root
giffler  MacBook-Pro2023  (e) mccli-env  ~
```

Summary & Outlook

- We have a basic working integration of C4P, S4P and REANA

- REANA C4P Job Controller will be part of REANA 0.9.4 release, so it can be deployed into the production REANA instance at AIP

- So far only, the serial workflow engine is supported and tested

- For the REANA development instance a hacked client is needed (input validation)

- Support for CWL and Snakemake will come with REANA 0.9.4

- Client input validation will be part of REANA 0.9.4 as well

Backup

How to get your jobs on Compute4PUNCH?

- Actual job submission in REANA is handled by a `reana-job-controller` per workflow (K8S Pod)

- There is now a prototype implementation of the Compute4PUNCH job controller available (reana-job-controller/pull/430)

- Prototype utilizes a tokenized (mytoken) ssh connection to the c4p-login node at GridKa to submit, watch and handle jobs on Compute4PUNCH

- Needs a replacement in the future by using e.g. HTCondor's remote submission
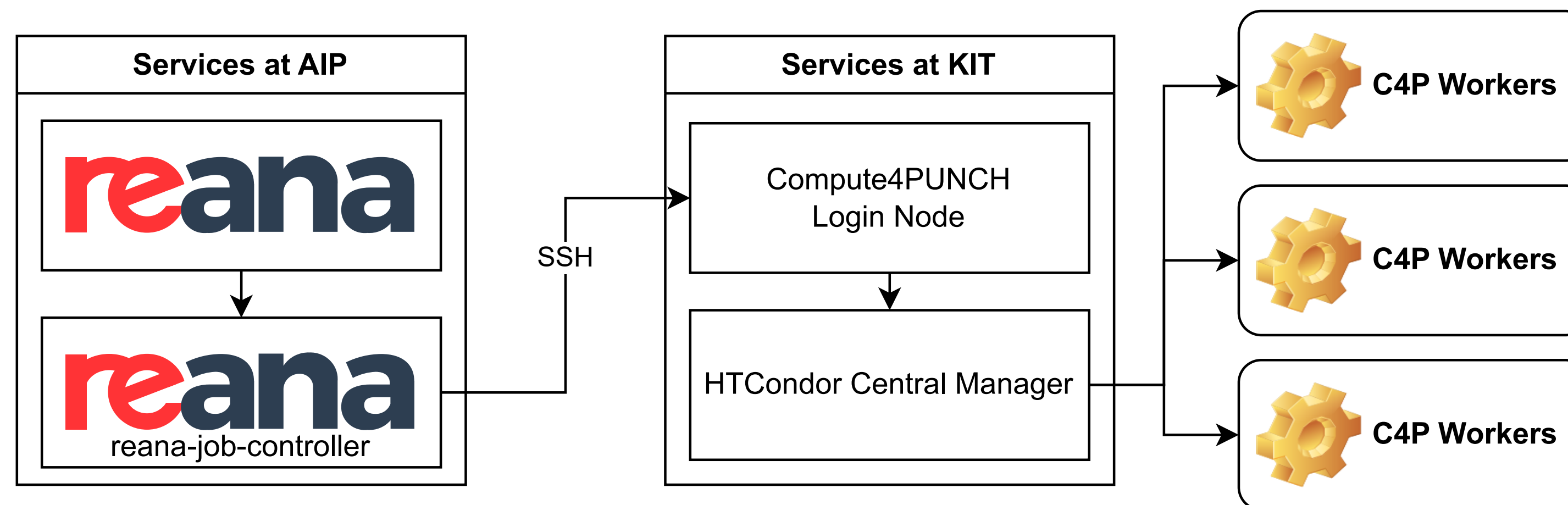
How to access Compute & Storage4PUNCH

- An access token is necessary to access Compute & Storage4PUNCH

- Luckily REANA already comprises the management of arbitrary secrets

- Benoit already implement a <u>convenient tool</u> to create and upload mytokens to REANA

- Token can be accessed in the REANA job controller, used for ssh access to c4p-login

Fine for the initial token, but how to deal with renewals?

- C4P's HTCondor will take care of the token renewals

Secret management commands ¶

secrets-add

Add secrets from literal string or from file.

Examples:

```
$ reana-client secrets-add --env RUCIO_USERNAME=ruciouser

$ reana-client secrets-add --file userkey.pem

$ reana-client secrets-add --env VOMSPROXY_FILE=x509up_u1000

                            --file /tmp/x509up_u1000
```

secrets-delete

Delete user secrets by name.

Examples:

```
$ reana-client secrets-delete RUCIO_USERNAME
```

secrets-list

List user secrets.

Examples:

```
$ reana-client secrets-list
```