

## APPENDIX IV: USEFUL UTILITIES AND TRICKS

### Utilities

Copying files from the Grid to Hep01: Makefiles

```
all: gridfiles.md5
```

```
gridfiles.xml: query.sh
```

```
./$< > $@
```

```
gridfiles.md5: gridfiles.xml
```

```
xsftproc /alice/data/util/xml2md5.xsl $< > $@
```

```
download: $(shell cut -c 49- files.md5)
```

```
/alice/data/%:
```

```
mkdir -p $(dir $@)
```

```
alien_cp alien:$@ file:$@
```

Copying directories efficiently from a server to a local machine: rsync

```
rsync -av --stats --progress --include="*/" --include="*.txt" --exclude="*.C"  
user@server.host.url.ac.za:/path/to/directory/ .
```

User specified aliases in ~/.bashrc

```
# User specific aliases and functions to quickly enter AliPhysics from  
CVMFS
```

```
alias init_ali='/cvmfs/alice.cern.ch/bin/alienv enter  
VO_ALICE@AliPhysics::VAN-20180902-1'
```

```
# Or to enter your own installation of AliPhysics
```

```
alias my_alice='alienv -w /alice/user/alice/sw enter  
VO_ALICE@AliPhysics::latest'
```

## Remote Editing

### *X11 Forwarding*

Atom packages:

- Remote Atom Server
- PlatformIO-IDE-Terminal

*Killing a process being listened to on the remote port 52698:*

List processes that are owned by me:

```
ps aux | grep gviljoen
```

Find the sshd process being listened to on port 52698 and kill it, by running:

```
kill -9 $processid
```

## Using Keras in R on the UCT HPC Cluster (not recommended)

Compiler variables set in ~/.R/Makevars

```
CC = gcc -std=gnu99
```

install.packages command needs to be modified to write packages in a directory where there are permissions and where the CRAN mirror is set, dependencies=TRUE allows R to read the Makevars compiler variables.

```
install.packages(pkgs="keras",lib="/scratch/username",  
repos="https://cloud.r-project.org",dependencies=TRUE)
```

## APPENDIX V: RUNNING AND MONITORING ROOT ANALYSIS TASKS

Once one is happy with the analysis task defined, one first needs to enter AliPhysics, by using one of the user-defined aliases, e.g.:

```
initialize_aliroot
```

Then, one gets a token from alien, to access the grid. This token will be valid for 24 hours. Since my CERN username is not the same as my username on HEP01, the command is:

```
alien-token-init username
```

Once the above commands have been run, one can run the analysis task on the grid, by setting the following parameters in the analysis macro (ana.C):

```
Bool_t local = kFALSE;
```

```
Bool_t gridTest = kFALSE;
```

Adding the appropriate run number and output directory:

```
alienHandler->AddRunNumber(265377);
```

```
alienHandler->SetGridWorkingDir("new-wd-momentum-test");
```

```
alienHandler->SetGridOutputDir("outDir265378");
```

Setting the run mode and starting the analysis:

```
alienHandler->SetRunMode("full");
```

```
//alienHandler->SetRunMode("terminate"); //this is run for merging  
stages
```

```
mgr->StartAnalysis("grid");
```

Assuming that one has added the appropriate CERN certificates, one can then view, manage and download the output of one's jobs on the MonALISA grid monitoring site for ALICE see **Figure 1** for an example screenshot of user job monitoring and **Figure 2** for the user interface for viewing the directory structure for the ALICE grid, in particular the user's working directory:

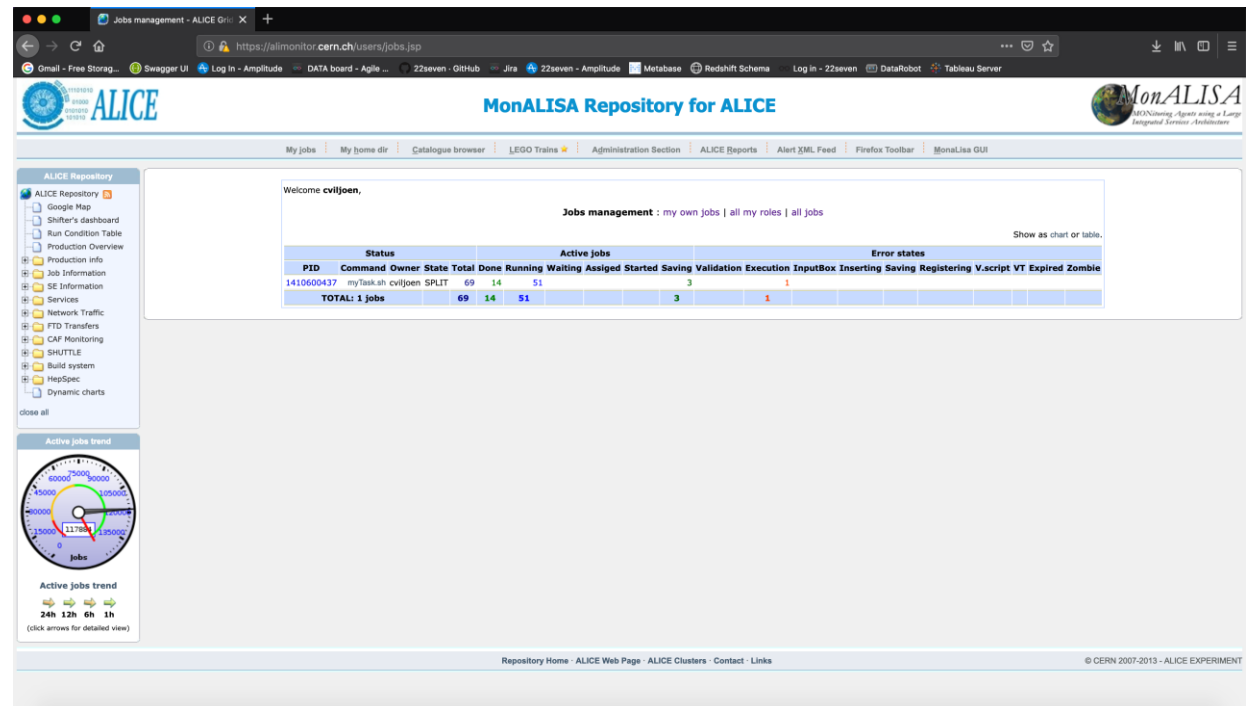


Figure 1: MonALISA Alice grid monitoring site, user jobs at url:

<https://alimonitor.cern.ch/users/jobs.jsp>

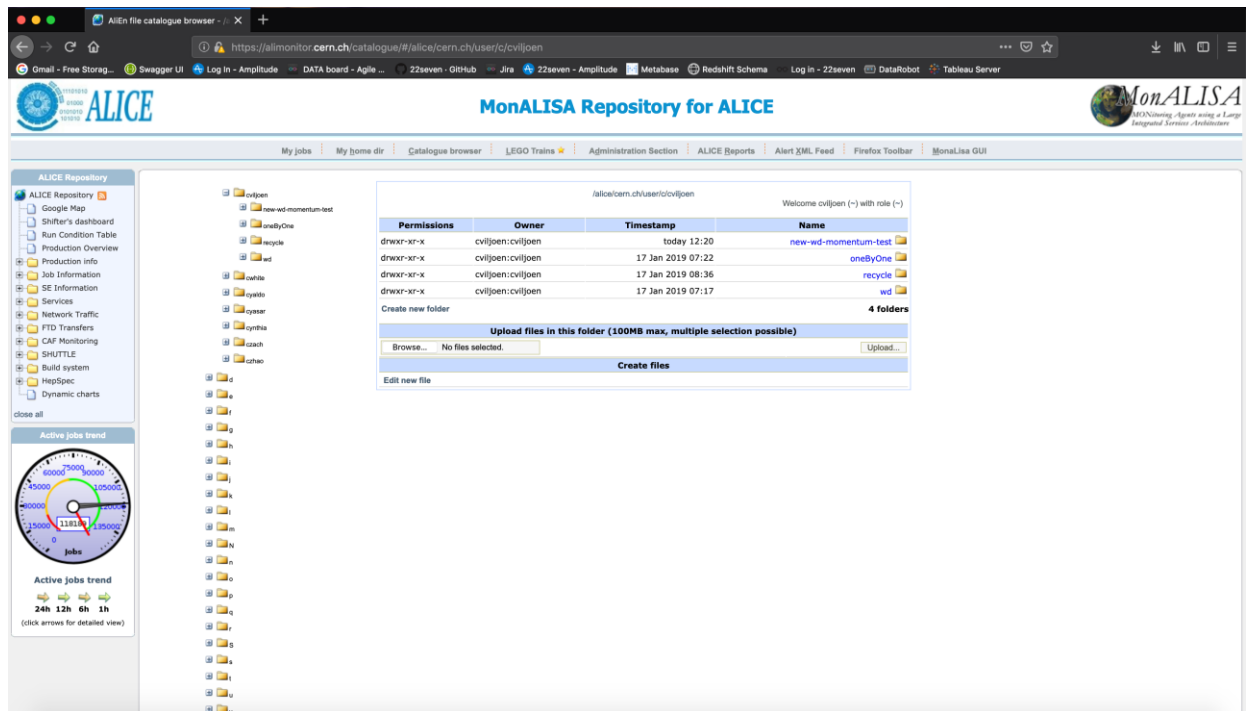


Figure 2: User working directory structure on MonALISA at url:

<https://alimonitor.cern.ch/catalogue/#/alice/cern.ch/user/c/cviljoen>

In Figure 3, a screenshot shows how subjobs belonging to a masterjob can be tracked by clicking on the process ID on the MonALISA jobs management webpage:

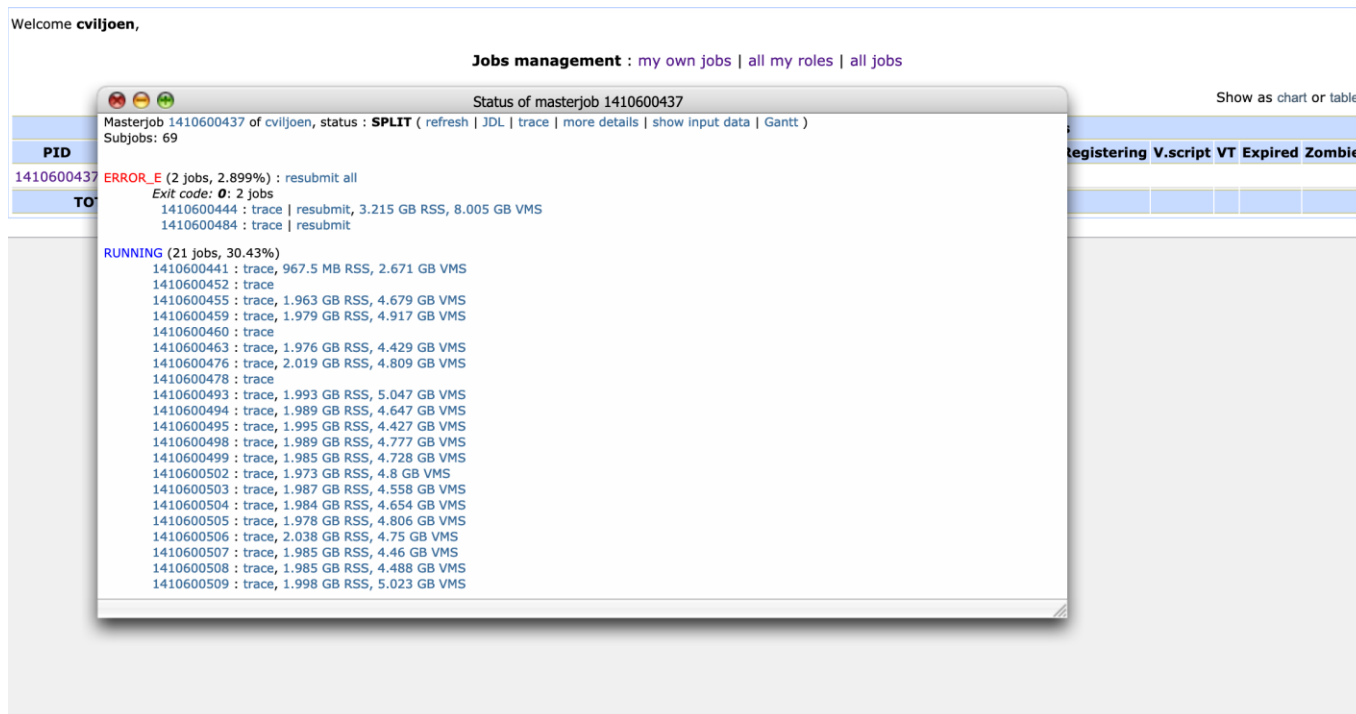


Figure 3: Tracking the status of subjobs of a master-job, by clicking on the process id (PID)

One can resubmit errored subjobs by browsing through the various error states in the “Status of masterjob” view and clicking on “resubmit all” for all processes that are in a specific error state.

The trace of a subjob (see **Figure 4** for an example screenshot) can give hints as to what caused a specific subjob to fall into an error state. In this case the job has an error state “ERROR\_E”, i.e. “Error in Execution”, since the job is using too much memory (memory and storage limits are allocated to each user and overusing either can downgrade the priority of a user’s jobs).

The alien shell can be accessed by running

```
aliensh
```

This gives access to the alien terminal, which is not strictly a bash terminal, but has similar commands, for instance the shell command to forcefully and recursively remove a directory:

```
rm -rf directory
```

would be achieved on an alien terminal by running:

```
rmdir directory
```

Killing a job is done in a similar fashion to the normal shell workflow, i.e. running

```
ps
```

To list the currently active processes and

```
kill $(process-id)
```

To kill a process and its attendant subprocesses, in case you figured out that you made a mistake and want to terminate a running process early for whatever reason.

```
https://alimonitor.cern.ch/jobs/trace.jsp?pid=1410600444
Gmail - Free Storage... Swagger UI Log in - Amplitude DATA board - Agile ... 22seven - GitHub 22seven - Amplitude Metabase Redshift Schema Log in - 22seven DataRobot Tableau Server

Trace of subjob 1410600444, masterjob 1410600437

Mar 03 12:23:24 [state]: Job 1410600444 inserted from allendb7.cern.ch (5) [Master Job is 1410600437]
Mar 03 12:23:26 [trace]: The Job has been taken by jobagent 10810.853360.181, ALiEn Version: v2.19.395
Mar 03 12:23:26 [state]: Job state transition from WAITING to ASSIGNED (to ALICE::CERN::CERN-MIRAGE)
Mar 03 12:23:27 [trace]: The job needs 10000 seconds, allowed until 1551622807 (Sun Mar 3 15:20:07 2019)
Mar 03 12:23:28 [state]: Job state transition to STARTED [=] procinfotime: 1551612208 site: ALICE::CERN::CERN-MIRAGE batchid: 6041 started: 1551612208 node: b7g42n0343.cern.ch
Mar 03 12:23:28 [trace]: Defining the environment variables: ALIEN_JDL_OUTPUTDIR=/alice/cern.ch/user/c/cvijoen/new-wd-momentum-test/outDir265378/000265377/004, ALIEN_JDL_PACKAGES=VO_ALICE@APISCONFIG::V1.1x#VO_ALICE@AliPhysics::VAN-20180902-1
Mar 03 12:23:28 [trace]: Request 5000 * 1 MB, found 88945 MB free!
Mar 03 12:23:28 [trace]: Creating the working directory /home/grid/alism54/alien-job-1410600444
Mar 03 12:23:29 [trace]: Downloading input file: /alice/cern.ch/user/c/cvijoen/new-wd-momentum-test/myTask.sh
Mar 03 12:23:29 [trace]: Putting the list of files in the file /pool/grid/alism54/alien-job-1410600444/wr.xml
Mar 03 12:23:30 [trace]: ProcInfo: runtime(s) avgcpu avgmem cputime rsz vszsize ncpus cpufamily cpuspeed maxresourcecost avgrsz avgvszsize
Mar 03 12:23:39 [trace]: Downloading input file: /alice/cern.ch/user/c/cvijoen/new-wd-momentum-test/AITRDdigitsExtract.h
Mar 03 12:23:39 [trace]: Downloading input file: /alice/cern.ch/user/c/cvijoen/new-wd-momentum-test/myTask_validation.sh
Mar 03 12:23:45 [trace]: Downloading input file: /alice/cern.ch/user/c/cvijoen/new-wd-momentum-test/AITRDdigitsExtract.cxx
Mar 03 12:23:45 [trace]: Downloading input file: /alice/cern.ch/user/c/cvijoen/new-wd-momentum-test/myTask.root
Mar 03 12:23:46 [trace]: Downloading input file: /alice/cern.ch/user/c/cvijoen/new-wd-momentum-test/myAnalysis.C
Mar 03 12:23:56 [state]: Job state transition from STARTED to RUNNING [=] procinfotime: 1551612236 site: ALICE::CERN::CERN-MIRAGE started: 1551612236 spyuri: b7g42n0343.cern.ch:8094 node: b7g42n0343.cern.ch
Mar 03 12:24:37 [proc]: 00:00:01 1 2 0 0 9520 323156 12 6 2194.916 0.00 0 0
Mar 03 12:30:55 [proc]: 00:05:42 342 24.10 3.4 154 2085060 4999180 12 6 2194.916 338.02 1650338 3779342
Mar 03 12:36:58 [error]: Killing the job (Using more than 8388608 memory (right now, 8394032))
Mar 03 12:36:59 [state]: Job state transition to ERROR_E [=] procinfotime: 1551613019 site: ALICE::CERN::CERN-MIRAGE resultsjdl: [
  User = "cvijoen";
  JobTag = {
    "comment:Automatically generated analysis JDL"
  };
  Packages = {
    "VO_ALICE@AliPhysics::VAN-20180902-1",
    "VO_ALICE@APISCONFIG::V1.1x"
  };
  Executable = "/alice/cern.ch/user/c/cvijoen/new-wd-momentum-test/myTask.sh";
  Arguments = "";
  InputFile = {
    "LF:/alice/cern.ch/user/c/cvijoen/new-wd-momentum-test/myAnalysis.C",
    "LF:/alice/cern.ch/user/c/cvijoen/new-wd-momentum-test/myTask.root",
    "LF:/alice/cern.ch/user/c/cvijoen/new-wd-momentum-test/AITRDdigitsExtract.cxx",
    "LF:/alice/cern.ch/user/c/cvijoen/new-wd-momentum-test/AITRDdigitsExtract.h"
  };
  InputData = {
    "LF:/alice/data/2016/LHC16g/000265377/pass1_CENT_WSD0/16000265377021.210/AIESDs.root_nodownload",
    "LF:/alice/data/2016/LHC16g/000265377/pass1_CENT_WSD0/16000265377021.303/AIESDs.root_nodownload",
    "LF:/alice/data/2016/LHC16g/000265377/pass1_CENT_WSD0/16000265377021.403/AIESDs.root_nodownload",
    "LF:/alice/data/2016/LHC16g/000265377/pass1_CENT_WSD0/16000265377021.511/AIESDs.root_nodownload",
    "LF:/alice/data/2016/LHC16g/000265377/pass1_CENT_WSD0/16000265377021.601/AIESDs.root_nodownload",
    "LF:/alice/data/2016/LHC16g/000265377/pass1_CENT_WSD0/16000265377021.704/AIESDs.root_nodownload",
    "LF:/alice/data/2016/LHC16g/000265377/pass1_CENT_WSD0/16000265377024.209/AIESDs.root_nodownload",
    "LF:/alice/data/2016/LHC16g/000265377/pass1_CENT_WSD0/16000265377025.705/AIESDs.root_nodownload",
    "LF:/alice/data/2016/LHC16g/000265377/pass1_CENT_WSD0/16000265377026.704/AIESDs.root_nodownload",
    "LF:/alice/data/2016/LHC16g/000265377/pass1_CENT_WSD0/16000265377028.106/AIESDs.root_nodownload",
    "LF:/alice/data/2016/LHC16g/000265377/pass1_CENT_WSD0/16000265377028.403/AIESDs.root_nodownload",
    "LF:/alice/data/2016/LHC16g/000265377/pass1_CENT_WSD0/16000265377028.409/AIESDs.root_nodownload",
    "LF:/alice/data/2016/LHC16g/000265377/pass1_CENT_WSD0/16000265377028.707/AIESDs.root_nodownload",
    "LF:/alice/data/2016/LHC16g/000265377/pass1_CENT_WSD0/16000265377032.308/AIESDs.root_nodownload",
    "LF:/alice/data/2016/LHC16g/000265377/pass1_CENT_WSD0/16000265377033.111/AIESDs.root_nodownload",
    "LF:/alice/data/2016/LHC16g/000265377/pass1_CENT_WSD0/16000265377033.602/AIESDs.root_nodownload",
    "LF:/alice/data/2016/LHC16g/000265377/pass1_CENT_WSD0/16000265377033.605/AIESDs.root_nodownload",
  }
];
```

Figure 4: Example trace of a subjob on MonALISA