Submission to the new cluster HTC23

Submission utility

To ease the transition to the new cluster and the general use of HTCondor, we implemented a solution based on environment modules. The traditional interaction methods, i.e. specifying all command line options, remain valid, yet less handy and more verbose.

The **`htc`** modules will set all environment variables needed to correctly submit to both the old and the new HTCondor clusters.
Once logged into any Tier 1 user interface, this utility will be available. You can list all the available modules using:

Showing available modules

```
apascolinit1@ui-tier1 ~
$ module avail
----------- /opt/exp_software/opssw/modules/modulefiles -----------
htc/auth  htc/ce  htc/local  use.own

Key:
modulepath  default-version
```

These **htc/*** modules have different roles:

- **htc/local** - to be used once you want to submit jobs to or query the local schedds sn-02 or sn01-htc, respectively the HTCondor 9.0 and 23 cluster access points. This is the default module loaded when loading the "**htc**" family.

variable	values	description
ver	9	selects the old HTCondor cluster and local schedd (sn-02)
	23	selects the new HTCondor cluster and local schedd (sn01-htc)

Usage of htc/local module

```
apascolinit1@ui-tier1 ~
$ module switch htc ver=9
apascolinit1@ui-tier1 ~
$ condor_q


-- Schedd: sn-02.cr.cnaf.infn.it : <131.154.192.42:9618?... @ 04/17/24 14:58:44
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 apascolinit1: 0 jobs; 0 completed, 0 removed, 0 idle, 0 running, 0 held, 0 suspended
Total for all users: 50164 jobs; 30960 completed, 1 removed, 12716 idle, 4514 running, 1973 held, 0
suspended

apascolinit1@ui-tier1 ~
$ module switch htc ver=23
apascolinit1@ui-tier1 ~
$ condor_q


-- Schedd: sn01-htc.cr.cnaf.infn.it : <131.154.192.242:9618?... @ 04/17/24 14:58:52
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 apascolinit1: 0 jobs; 0 completed, 0 removed, 0 idle, 0 running, 0 held, 0 suspended
Total for all users: 0 jobs; 0 completed, 0 removed, 0 idle, 0 running, 0 held, 0 suspende
```

- **htc/ce** - eases the usage of **condor_q** and **condor_submit** commands setting up all the needed variables to contact our Grid compute entryopoints.

variable	values	description
num	1,2,3,4	connects to ce{num}-htc (**new cluster**)
	5,6,7	connects to ce{num}-htc (**old cluster**)
auth	VOMS,SCITOKENS	calls **htc/auth** with the selected auth method

Usage of htc/ce module

```
apascolinit1@ui-tier1 ~
$ condor_q
Error:
......

apascolinit1@ui-tier1 ~
$ module switch htc/ce auth=SCITOKENS num=2
Don't forget to "export BEARER_TOKEN=$(oidc-token <client-name>)"!

Switching from htc/ce{auth=SCITOKENS:num=2} to htc/ce{auth=SCITOKENS:num=2}
Loading requirement: htc/auth{auth=SCITOKENS}

apascolinit1@ui-tier1 ~
$ export BEARER_TOKEN=$(oidc-token htc23)
apascolinit1@ui-tier1 ~
$ condor_q


-- Schedd: ce02-htc.cr.cnaf.infn.it : <131.154.192.41:9619?... @ 04/17/24 15:48:24
OWNER BATCH_NAME SUBMITTED DONE RUN IDLE HOLD TOTAL JOB_IDS
..........
..........
..........
```

All modules in the **`htc`** family provide on-line help via the "`module help <module name>`" command, e.g.:

1. **Executable and Submit file**

```
budda@ui-tier1:~
 $ module help htc
----------------------------------------------------------------------
Module Specific Help for /opt/exp_software/opssw/modules/modulefiles/htc/local:

Defines environment variables and aliases to ease the interaction with the INFN-T1 HTCondor local job
submission system
----------------------------------------------------------------------
```

Local Submission

To submit local jobs, the behavior is the same as for HTCondor 9 using the *Jobs UI*.

1. Submitting a job to the cluster.

Executable and Submit file

```
apascolinit1@ui-tier1 ~
$ cat sleep.sh
#!/bin/env bash
sleep $1


apascolinit1@ui-tier1 ~
$ cat submit.sub
# Unix submit description file
# subimt.sub -- simple sleep job

batch_name              = Local-Sleep
executable              = sleep.sh
arguments               = 3600
log                     = $(batch_name).log.$(Process)
output                  = $(batch_name).out.$(Process)
error                   = $(batch_name).err.$(Process)
should_transfer_files   = Yes
when_to_transfer_output = ON_EXIT

queue
```

Submission and control of job status

```
apascolinit1@ui-tier1 ~
$ module switch htc ver=23

apascolinit1@ui-tier1 ~
$ condor_submit submit.sub
Submitting job(s).
1 job(s) submitted to cluster 15.

apascolinit1@ui-tier1 ~
$ condor_q


-- Schedd: sn01-htc.cr.cnaf.infn.it : <131.154.192.242:9618?... @ 03/18/24 17:15:44
OWNER        BATCH_NAME     SUBMITTED   DONE   RUN    IDLE  TOTAL JOB_IDS
apascolinit1 Local-Sleep   3/18 17:15      _      1      _      1 15.0

Total for query: 1 jobs; 0 completed, 0 removed, 0 idle, 1 running, 0 held, 0 suspended
Total for apascolinit1: 1 jobs; 0 completed, 0 removed, 0 idle, 1 running, 0 held, 0 suspended
Total for all users: 1 jobs; 0 completed, 0 removed, 0 idle, 1 running, 0 held, 0 suspended
```

Grid Submission

The GRID submission part on the ce01-htc is nearly the same as the one used to submit on the old cluster. You can use 2 types of authentication methods:

Token submission

That the steps are identical to those in the HTCondor 9 cluster::

1. Register a Client (or upload it of an already submitted)

Register a new Client

```
apascolinit1@ui-tier1 ~
$ eval `oidc-agent-service use`
23025

apascolinit1@ui-tier1 ~
$ oidc-gen -w device
Enter short name for the account to configure: htc23
[1] https://iam-t1-computing.cloud.cnaf.infn.it/
...
...
Issuer [https://iam-t1-computing.cloud.cnaf.infn.it/]: <enter>
The following scopes are supported: openid profile email address phone offline_access
eduperson_scoped_affiliation eduperson_entitlement eduperson_assurance entitlements
Scopes or 'max' (space separated) [openid profile offline_access]: profile wlcg.groups wlcg compute.
create compute.modify compute.read compute.cancel
Registering Client ...
Generating account configuration ...
accepted

Using a browser on any device, visit:
https://iam-t1-computing.cloud.cnaf.infn.it/device

And enter the code: REDACTED
...
...
...
Enter encryption password for account configuration 'htc23': <passwd>
Confirm encryption Password: <passwd>
Everything setup correctly!
```

2. Get a token for submission

```
apascolinit1@ui-tier1 ~
$ oidc-add htc23
Enter decryption password for account config 'htc23': <passwd>
success

apascolinit1@ui-tier1 ~
$ umask 0077 ; oidc-token htc23 > ${HOME}/token
```

3. Submit a test job

Submit file

```
apascolinit1@ui-tier1 ~
$ cat submit_token.sub
# Unix submit description file
# subimt.sub -- simple sleep job

scitokens_file          = $ENV(HOME)/token
+owner                  = undefined

batch_name              = Grid-Token-Sleep
executable              = sleep.sh
arguments               = 3600
log                     = $(batch_name).log.$(Process)
output                  = $(batch_name).out.$(Process)
error                   = $(batch_name).err.$(Process)
should_transfer_files   = Yes
when_to_transfer_output = ON_EXIT

queue
```

Job submission with Token

```
apascolinit1@ui-tier1 ~
$ module switch htc/ce auth=SCITOKENS num=1
Don't forget to "export BEARER_TOKEN=$(oidc-token <client-name>)"!

apascolinit1@ui-tier1 ~
$ export BEARER_TOKEN=$(oidc-token htc23)

apascolinit1@ui-tier1 ~
$ condor_submit submit_token.sub
Submitting job(s).
1 job(s) submitted to cluster 35.

apascolinit1@ui-tier1 ~
$ condor_q


-- Schedd: ce01-htc.cr.cnaf.infn.it : <131.154.193.64:9619?... @ 03/19/24 10:35:43
OWNER        BATCH_NAME          SUBMITTED   DONE   RUN    IDLE  TOTAL JOB_IDS
apascolinius Grid-Token-Sleep   3/19 10:35      _      _      1      1 35.0

Total for query: 1 jobs; 0 completed, 0 removed, 1 idle, 0 running, 0 held, 0 suspended
Total for apascolinius: 1 jobs; 0 completed, 0 removed, 1 idle, 0 running, 0 held, 0 suspended
Total for all users: 1 jobs; 0 completed, 0 removed, 1 idle, 0 running, 0 held, 0 suspended
```

SSL submission

The SSL Submission substitution of proxy, this process is almost identical.

CAVEAT

To be able to submit jobs using the SSL authentication, your **x509 User Proxy FQAN** must be mapped in the CE configuration.
You will need to send to the support team via the user-support@lists.cnaf.infn.it mailing list the output of the `voms-proxy-info --all --chain` corresponding to a valid voms proxy:

```
budda@ui-tier1:~
 $ voms-proxy-info --all --chain
=== Proxy Chain Information ===
X.509 v3 certificate
Subject: CN=1569994718,CN=Carmelo Pellegrino cpellegr@infn.it,O=Istituto Nazionale di Fisica Nucleare,
C=IT,DC=tcs,DC=terena,DC=org
Issuer: CN=Carmelo Pellegrino cpellegr@infn.it,O=Istituto Nazionale di Fisica Nucleare,C=IT,DC=tcs,
DC=terena,DC=org
Valid from: Tue Apr 09 16:18:41 CEST 2024
Valid to: Wed Apr 10 04:18:41 CEST 2024
CA: false
Signature alg: SHA384WITHRSA
Public key type: RSA 2048bit
Allowed usage: digitalSignature keyEncipherment
Serial number: 1569994718
VOMS extensions: yes.

X.509 v3 certificate
Subject: CN=Carmelo Pellegrino cpellegr@infn.it,O=Istituto Nazionale di Fisica Nucleare,C=IT,DC=tcs,
DC=terena,DC=org
Issuer: CN=GEANT TCS Authentication RSA CA 4B,O=GEANT Vereniging,C=NL
Valid from: Mon Oct 16 12:57:40 CEST 2023
Valid to: Thu Nov 14 11:57:40 CET 2024
Subject alternative names:
  email: carmelo.pellegrino@cnaf.infn.it
CA: false
Signature alg: SHA384WITHRSA
Public key type: RSA 8192bit
Allowed usage: digitalSignature keyEncipherment
Allowed extended usage: clientAuth emailProtection
Serial number: 732379619615320567364636865718653331 48

=== Proxy Information ===
subject   : /DC=org/DC=terena/DC=tcs/C=IT/O=Istituto Nazionale di Fisica Nucleare/CN=Carmelo Pellegrino
cpellegr@infn.it/CN=1569994718
issuer    : /DC=org/DC=terena/DC=tcs/C=IT/O=Istituto Nazionale di Fisica Nucleare/CN=Carmelo Pellegrino
cpellegr@infn.it
identity  : /DC=org/DC=terena/DC=tcs/C=IT/O=Istituto Nazionale di Fisica Nucleare/CN=Carmelo Pellegrino
cpellegr@infn.it
type      : RFC3820 compliant impersonation proxy
strength  : 2048
path      : /tmp/x509up_u23069
timeleft  : 00:00:00
key usage : Digital Signature, Key Encipherment
=== VO km3net.org extension information ===
VO        : km3net.org
subject   : /DC=org/DC=terena/DC=tcs/C=IT/O=Istituto Nazionale di Fisica Nucleare/CN=Carmelo Pellegrino
cpellegr@infn.it
issuer    : /DC=org/DC=terena/DC=tcs/C=IT/ST=Napoli/O=Universita degli Studi di Napoli FEDERICO II
/CN=voms02.scope.unina.it
attribute : /km3net.org/Role=NULL/Capability=NULL
timeleft  : 00:00:00
uri       : voms02.scope.unina.it:15005
```

1. Get a proxy with **voms-proxy-init**

```
apascolinit1@ui-tier1 ~
$ voms-proxy-init --voms cms
Enter GRID pass phrase for this identity:
Contacting voms2.cern.ch:15002 [/DC=ch/DC=cern/OU=computers/CN=voms2.cern.ch] "cms"...
Remote VOMS server contacted succesfully.


Created proxy in /tmp/x509up_u23077.

Your proxy is valid until Tue Mar 19 22:39:41 CET 2024
```

2. Submit a job to the CE

Submit file

```
apascolinit1@ui-tier1 ~
$ cat submit_ssl.sub
# Unix submit description file
# subimt.sub -- simple sleep job

use_x509userproxy       = true
+owner                  = undefined

batch_name              = Grid-SSL-Sleep
executable              = sleep.sh
arguments               = 3600
log                     = $(batch_name).log.$(Process)
output                  = $(batch_name).out.$(Process)
error                   = $(batch_name).err.$(Process)
should_transfer_files   = Yes
when_to_transfer_output = ON_EXIT

queue
```

Submit a job with SSL

```
apascolinit1@ui-tier1 ~
$ module switch htc/ce auth=VOMS num=1
Don't forget to voms-proxy-init!

apascolinit1@ui-tier1 ~
$ condor_submit submit_ssl.sub
Submitting job(s).
1 job(s) submitted to cluster 36.

apascolinit1@ui-tier1 ~
$ condor_q


-- Schedd: ce01-htc.cr.cnaf.infn.it : <131.154.193.64:9619?... @ 03/19/24 10:45:18
OWNER      BATCH_NAME        SUBMITTED   DONE   RUN    IDLE  TOTAL JOB_IDS
apascolini Grid-SSL-Sleep   3/19 10:44      _      1      _      1 36.0

Total for query: 1 jobs; 0 completed, 0 removed, 0 idle, 1 running, 0 held, 0 suspended
Total for apascolini: 1 jobs; 0 completed, 0 removed, 0 idle, 1 running, 0 held, 0 suspended
Total for all users: 2 jobs; 1 completed, 0 removed, 0 idle, 1 running, 0 held, 0 suspended
```