ARC CE – Htcondor sous Centos7

CENTRE DE PHYSIQUE DES PARTICULES DE MARSEILLE
CPPM

Retour d’expérience

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20 juin 2018

Un plan

Des ressources

Schéma de fonctionnement

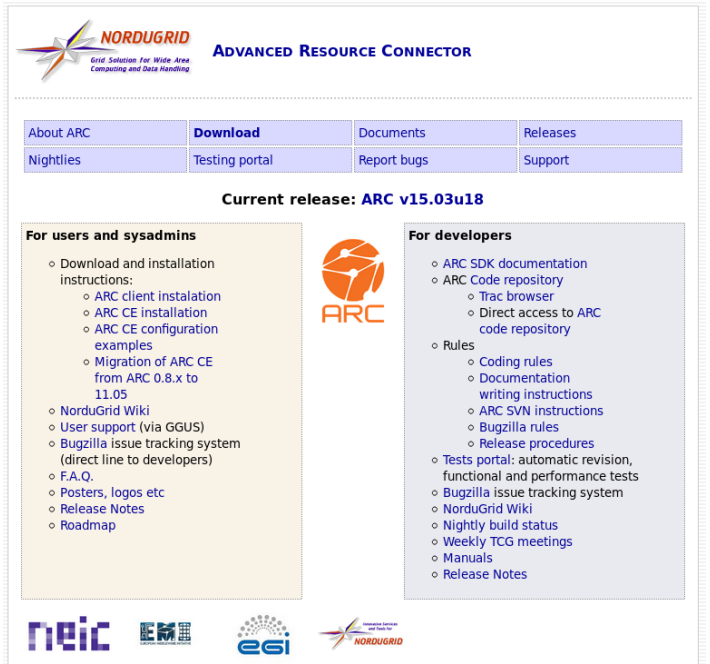
HTCondor

- Config, Processus, Interfaces
- Gestion d’une hiérarchie de groupes

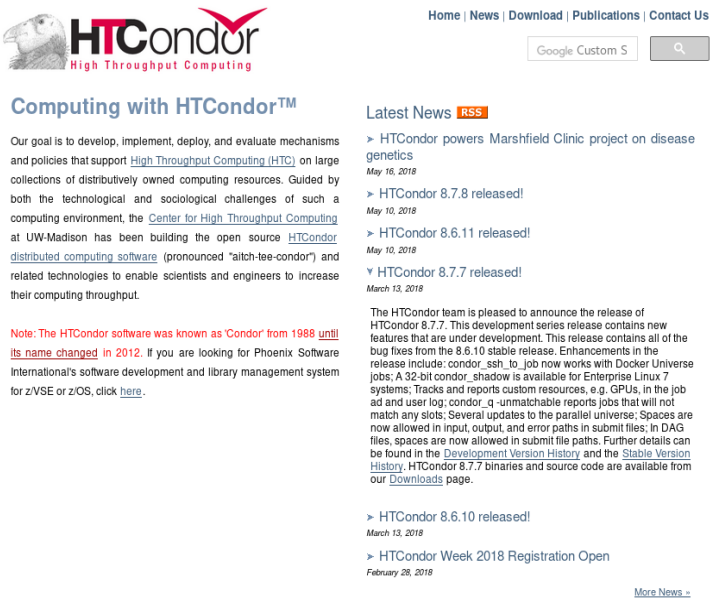
ARC

- Procesus, Interfaces
- Config, Accounting, Monitoring

Ressources

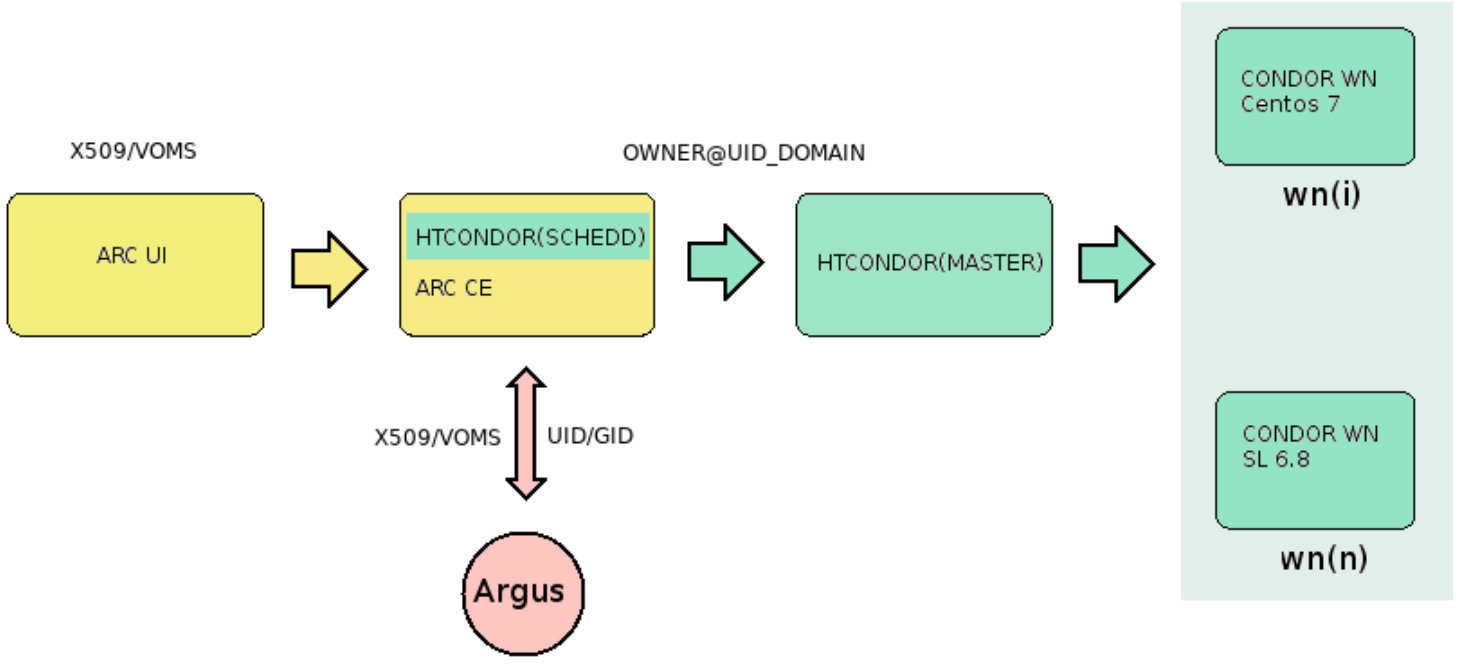


http://www.nordugrid.org/arc



http://research.cs.wisc.edu/htcondor

Le cluster – Schéma



Sous Centos7

Des dépôts a configurer:

- epel-release
- htcondor-stable-rhel7.repo
  (http://research.cs.wisc.edu/htcondor/yum/)
- Dans le serveur Arc
  - Nordugrid-release
    https://download.nordugrid.org
    15.03-1.el7.centos (latest)
  - umd-4

Des paquets a installer :

- Condor (tout nœud)
  8.6.10-1/11-1
- Dans le serveur Arc :
  - Un certificat serveur
  - EGI IGTF release
  - Nordugrid-compute-element
    15.03-1.el7.centos latest
  - des packages UMD4 :
    - argus-pep, argus-pep-common, etc
    - Apel-server
    - lcmaps, lcmaps-pugins, etc
- Dans les Wns
  - nordugrid-arc-clients

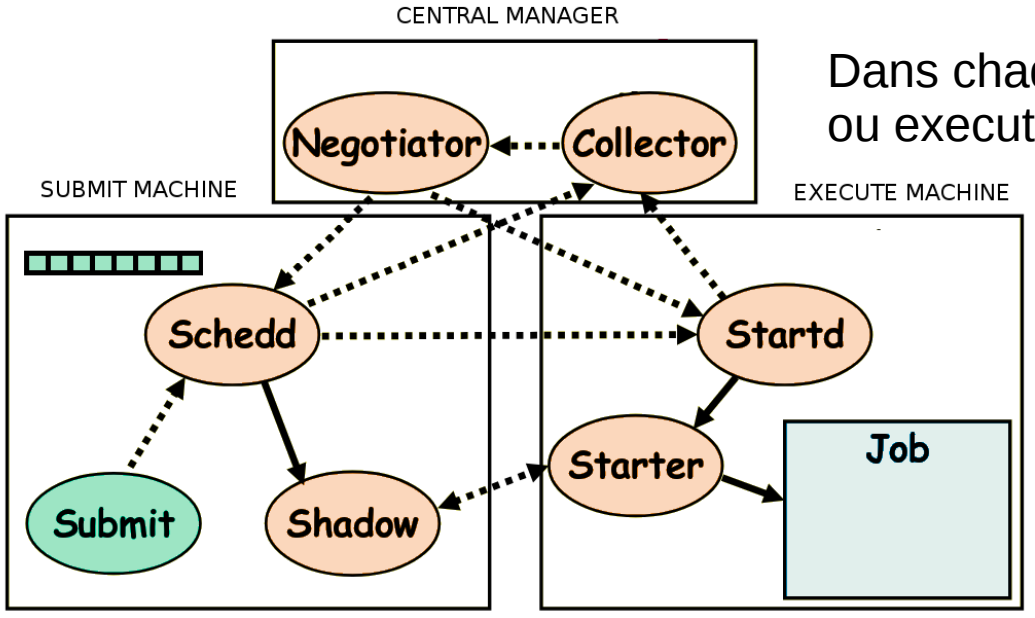
Notre démarche

- Suivre ARC HTCondor Basic Install
  - https://www.gridpp.ac.uk/wiki/ARC_HTCondor_Basic_Install
- Valider Condor

  A partir du « master condor»
  - Tester l'envoi de jobs, prévoir un utilisateur Unix « test » dans toute machine avec condor installée.
- Valider la chaîne Arc + Condor avec un mapping statique.

  A partir d'une UI (avec le client arc installée), il faudra prévoir (dans le arc)
  - un grid-mapfile avec une ligne "/O=GRID-FR/C=FR/O=CNRS/OU=CPPM/CN=XXX YYY ZZZ" test
  - Un user « test » (arc, condor, wn's)
- Voms
- Valider Argus
  - Avec un proxy interroger le serveur Argus avec le client arc-lcmaps
- Configurer pools (arc, condor, wns)
- Declarer le service dans la local BDII et GOCDB
- Monitoring, Accounting, etc

HTCONDOR Machines-Processus



Dans chaque type de nœud submit, master ou execute la configuration de condor diffère.

Éditer DAEMON_LIST en conséquence

DAEMON_LIST = COLLECTOR, MASTER, NEGOTIATOR, SCHEDD, STARTD

HTCondor et dynamic slots

SLOT_TYPE_1 = cpus=100%,disk=100%,swap=100%
SLOT_TYPE_1_PARTITIONABLE = TRUE
NUM_SLOTS = 1
NUM_SLOTS_TYPE_1 = 1

```
[root@marcce01 config.d]# condor_status -server
Name                                OpSys       Arch   LoadAv Memory   D

slot1@marwn68.in2p3.fr              LINUX       X86_64  1.000    11850
slot1_1@marwn68.in2p3.fr            LINUX       X86_64  0.000      512
slot1_2@marwn68.in2p3.fr            LINUX       X86_64  0.000      512
slot1_3@marwn68.in2p3.fr            LINUX       X86_64  0.000      512
slot1_4@marwn68.in2p3.fr            LINUX       X86_64  0.460      512
slot1_5@marwn68.in2p3.fr            LINUX       X86_64  1.000      512
slot1_6@marwn68.in2p3.fr            LINUX       X86_64  1.000      512
slot1_7@marwn68.in2p3.fr            LINUX       X86_64  1.000      512
slot1_8@marwn68.in2p3.fr            LINUX       X86_64  1.000      512
```

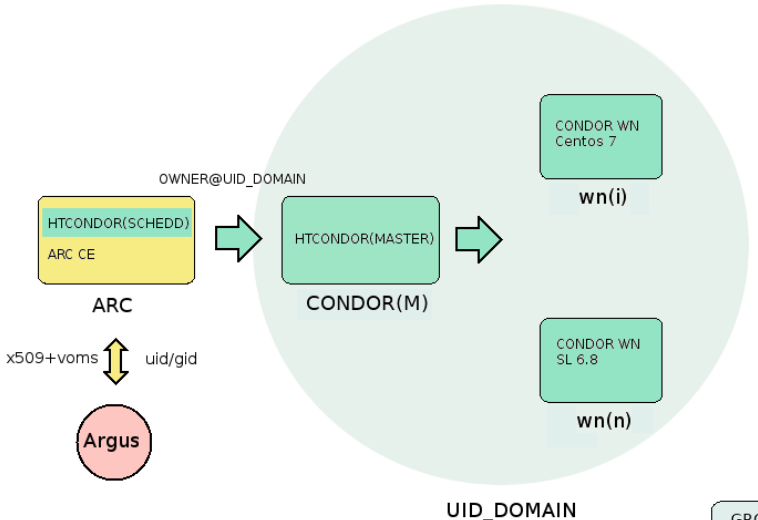
HTCondor et multicore

```
SUBMIT_REQUIREMENT_NAMES = slots

SUBMIT_REQUIREMENT_slots = (RequestCpus == 1) || \
                    (RequestCpus == 8 && x509UserProxyVOName "atlas")

SUBMIT_REQUIREMENT_slots_REASON = "Only 1core requirements are accepted"
```

HTCONDOR fragmentation

```
DAEMON_LIST = $(DAEMON_LIST) DEFRAG
DEFRAG_INTERVAL = 3600
# one x startd daemon
DEFRAG_DRAINING_MACHINES_PER_HOUR = 1.0
# max number of whole machines ( default Cpus == TotalCpus && Offline=!=True )
DEFRAG_MAX_WHOLE_MACHINES = 20
# the maximum number of draining machines
DEFRAG_MAX_CONCURRENT_DRAINING = 10
# which machines are already operating as whole machines
DEFRAG_WHOLE_MACHINE_EXPR = ((Cpus == TotalCpus) || (Cpus >= 8))
```

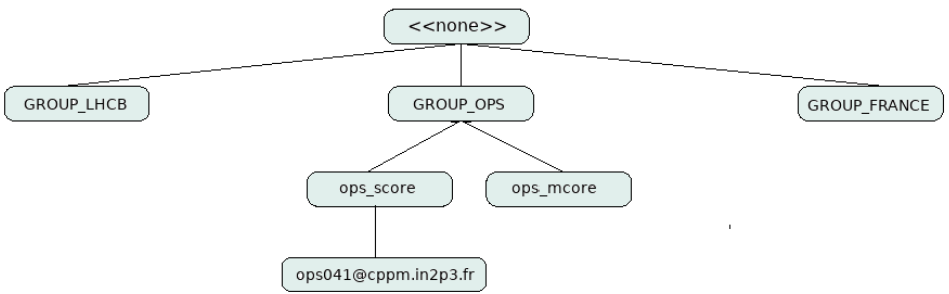
HTCondor Hierarchical groups



Pour Condor un utilisateur est de la forme OWNER@UID_DOMAIN.

Tout utilisateur au départ a la même priorité et quota.

Condor offre la possibilité d'agrouper des utilisateurs en agissant su le classad « AccountingGroup » et ensuite configurer des quotas et priorités



✗ OWNER@UID_DOMAIN

✓ GROUP.SUBGROUP.OWNER@UID_DOMAIN

HTCondor groups, subgroups

OWNER@UID_DOMAIN => GRUP.SUBGROUP.OWNER@UID_DOMAIN

Ex : france008@cppm.in2p3.fr => group_FRANCE.france_score.france008@cppm.in2p3.fr

On doit modifier le classad :

SUBMIT_EXPRS = $(SUBMIT_EXPRS) **VAcctGroup, VAcctSubGroup, AccountingGroup**

Contribution de différents classads :

- VAcctGroup <= **x509UserProxyVOName**
- VAcctSubGroup <= substr(**owner**) + score/mcore(**RequestCPUS**)
- AccountingGroup <= VAcctGroup.VAcctSubGroup.**owner**@**UID_DOMAIN**

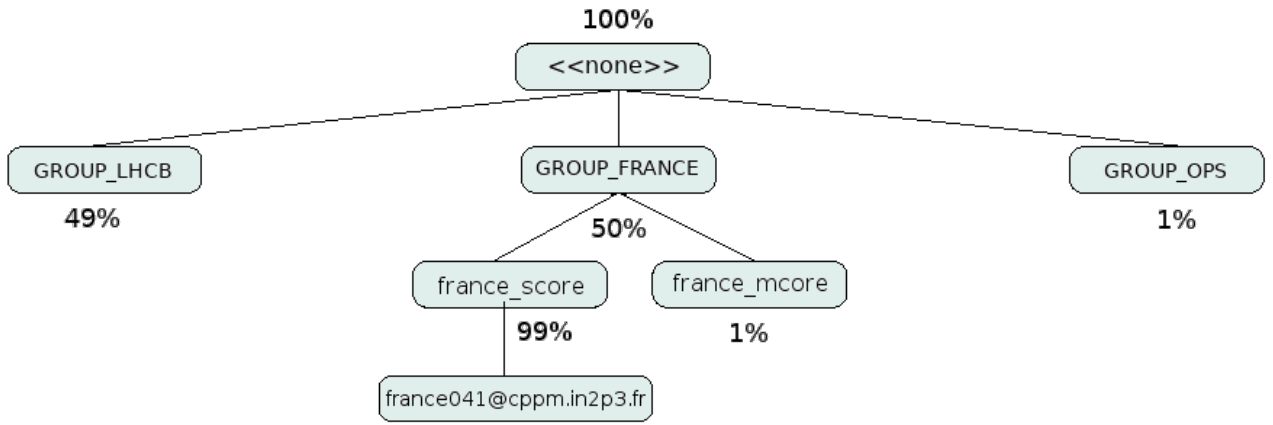
Ex :

x509UserProxyVOName (france) => group_FRANCE

owner (france008) + RequestCpus => france_score/france_mcore

Owner @ UID_DOMAIN (*) => france008@cppm.in2p3.fr

HTCondor quota



GROUPS, QUOTAS, SURPLUS

GROUP_NAMES=group_FRANCE,group_FRANCE.france_score,group_FRANCE.france_mcore

GROUP_QUOTA_DYNAMIC_group_FRANCE = 0.5
GROUP_QUOTA_DYNAMIC_group_FRANCE.france_score = 0.99
GROUP_QUOTA_DYNAMIC_group_FRANCE.france_mcore = 0.01

GROUP_ACCEPT_SURPLUS_group_FRANCE = False
GROUP_ACCEPT_SURPLUS_group_FRANCE.france_score = True
GROUP_ACCEPT_SURPLUS_group_FRANCE.france_mcore = True

HTCondor quota et surplus

Group User Name	Config Quota	Use Surplus	Effective Priority	Priority Factor	Res In Use	Total Usage (wghted-hrs)	Time Since Last Usage	Requested Resources
group_DTEAM.dte_mcore	0.70	Regroup		1000.00	0	6.70	9+21:53	0
group_DTEAM.dte_score	0.30	Regroup		100.00	0	1552.00	8+16:49	0
dte177@cppm.in2p3.fr			50.00	100.00	0	0.84	8+16:49	
group_FRANCE	0.50	Regroup		1000.00	0	24.24	34+03:28	0
group_FRANCE.france_mcore	0.01	Regroup		1000.00	0	0.00	17506+13:1	0
group_FRANCE.france_score	0.99	Regroup		200.00	0	18.69	0+22:07	0
france186@cppm.in2p3.fr			100.00	200.00	0	10.21	7+23:41	
france044@cppm.in2p3.fr			100.00	200.00	0	0.98	0+22:07	
france130@cppm.in2p3.fr			100.00	200.00	0	7.50	47+00:08	
group_OPS.ops_mcore	0.01	Regroup		1000.00	0	0.00	17506+13:1	0
group_OPS.ops_score	0.99	Regroup		300.00	0	12.04	0+00:04	1
ops036@cppm.in2p3.fr			150.00	300.00	0	1.20	0+06:13	
ops049@cppm.in2p3.fr			150.00	300.00	0	1.20	0+00:31	
ops018@cppm.in2p3.fr			150.00	300.00	0	6.29	8+16:42	
ops010@cppm.in2p3.fr			150.26	300.00	0	3.35	0+00:04	
group_DTEAM	0.15	Regroup		1000.00	0	0.00	17506+13:1	0
group_FORMATION	0.00	Regroup		1000.00	0	0.00	17506+13:1	0
group_FORMATION.forrzk_mcore	0.01	Regroup		1000.00	0	0.00	17506+13:1	0
group_FORMATION.forrzk_score	0.99	Regroup		600.00	0	4.65	4+15:30	0
forrzk152@cppm.in2p3.fr			300.00	600.00	0	4.65	4+15:30	
group_HIGHPRIO	0.00	Regroup		1000.00	0	0.00	17506+13:1	0

Output commande « condor_userprio »

HTCondor priorité

Deux possibilités :

Avec la commande « condor_userprio »

ex :

#condor_userprio -setfactor 600

#condor_userprio -setfactor 600 group_FRANCE.france_score.france148@cppm.in2p3.fr

Persistent dans la config (Condor File)

GROUP_PRIO_FACTOR_group_FORMATION = 1000.0

GROUP_PRIO_FACTOR_group_FORMATION.forrzk_score = 600.0

GROUP_PRIO_FACTOR_group_FORMATION.forrzk_mcore = 1000.0

HTCondor group priorité

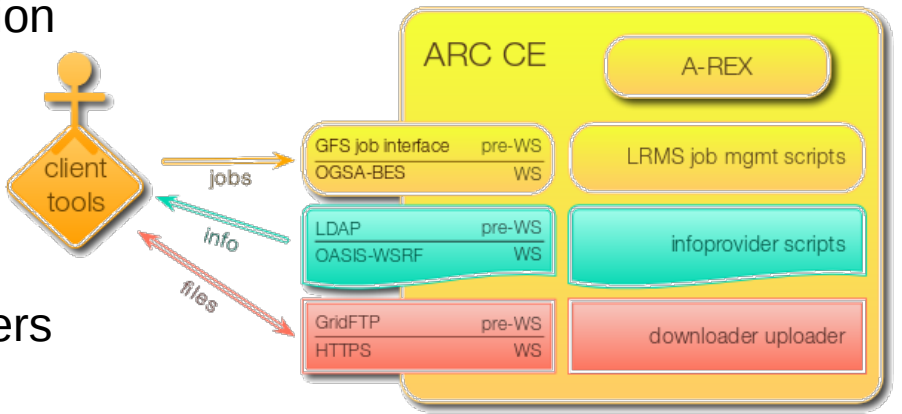
Group User Name	Config Quota	Use Surplus	Effective Priority	Priority Factor	Res In Use	Total Usage (wghted-hrs)	Time Since Last Usage	Requested Resources
group_DTEAM.dte_mcore	0.70	Regroup		1000.00	0	6.70	9+21:53	0
group_DTEAM.dte_score	0.30	Regroup		100.00	0	1552.00	8+16:49	0
dte177@cppm.in2p3.fr			50.00	100.00	0	0.84	8+16:49	
group_FRANCE	0.50	Regroup		1000.00	0	24.24	34+03:28	0
group_FRANCE.france_mcore	0.01	Regroup		1000.00	0	0.00	17506+13:1	0
group_FRANCE.france_score	0.99	Regroup		200.00	0	18.69	0+22:07	0
france186@cppm.in2p3.fr			100.00	200.00	0	10.21	7+23:41	
france044@cppm.in2p3.fr			100.00	200.00	0	0.98	0+22:07	
france130@cppm.in2p3.fr			100.00	200.00	0	7.50	47+00:08	
group_OPS.ops_mcore	0.01	Regroup		1000.00	0	0.00	17506+13:1	0
group_OPS.ops_score	0.99	Regroup		300.00	0	12.04	0+00:04	1
ops036@cppm.in2p3.fr			150.00	300.00	0	1.20	0+06:13	
ops049@cppm.in2p3.fr			150.00	300.00	0	1.20	0+00:31	
ops018@cppm.in2p3.fr			150.00	300.00	0	6.29	8+16:42	
ops010@cppm.in2p3.fr			150.26	300.00	0	3.35	0+00:04	
group_DTEAM	0.15	Regroup		1000.00	0	0.00	17506+13:1	0
group_FORMATION	0.00	Regroup		1000.00	0	0.00	17506+13:1	0
group_FORMATION.forrzk_mcore	0.01	Regroup		1000.00	0	0.00	17506+13:1	0
group_FORMATION.forrzk_score	0.99	Regroup		600.00	0	4.65	4+15:30	0
forrzk152@cppm.in2p3.fr			300.00	600.00	0	4.65	4+15:30	
group_HIGHPRIO	0.00	Regroup		1000.00	0	0.00	17506+13:1	0

Output commande « condor_userprio »

ARC Processus et Interfaces

A-REX (the execution service)

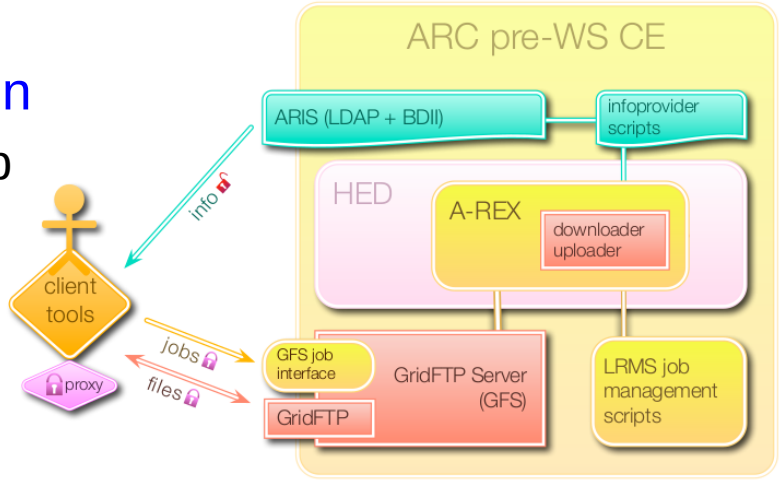
- Accepter les demandes d'execution
- Executer dans le batch system local
- Surveiller le statut de chaque travail.
- Pré and post traitement des fichiers



ARC Interfaces

Deux interfaces de soumission

- pre-web service Ldap/gridftp
- web serviceHttps




```
[carranza@martb08 exo4]$ arcinfo marcce01.in2p3.fr
Computing service: marcce01 (IN2P3-CPPM) (production)
  Information endpoint: ldap://marcce01.in2p3.fr:2135/Mds-Vo-Name=local,o=grid
  Information endpoint: ldap://marcce01.in2p3.fr:2135/Mds-Vo-Name=resource,o=grid
  Information endpoint: ldap://marcce01.in2p3.fr:2135/o=glue
  Information endpoint: https://marcce01.in2p3.fr:60000/arex
  Information endpoint: https://marcce01.in2p3.fr:60000/arex
  Submission endpoint: https://marcce01.in2p3.fr:60000/arex (status: ok, interface: org.ogf.bes)
  Submission endpoint: https://marcce01.in2p3.fr:60000/arex (status: ok, interface: org.ogf.glue.emies.a
  Submission endpoint: gsiftp://marcce01.in2p3.fr:2811/jobs (status: ok, interface: org.nordugrid.gridft
```

ARC - Configuration

Un ficher « arc.conf » avec différents sections permettant de configurer services et processus notamment :

[common]
... réseau, sécurité et LRMS
[cluster]
... authorized vos, cluster info, etc
[grid-manager]
... A-REX, comportement des jobs, directories, accounting (JURA)
[gridftpd]
... serveur pour le gridftp protocole, ports, mapping, etc
[gridftp/jobs]
... interface de soumission (web, pre-web)
[infosys]
... système d'information, le format de l'information publiée par le serveur.
[queue/xxx]
..... configuration de queues, architecture, condor « requirements », etc

ARC - ARGUS interaction

Dans la section « gridftpd » du fichier arc.conf

[gridftpd]

...

unixmap="* lcmaps liblcmaps.so /usr/lib64 /etc/lcmaps/lcmaps.db voms"

unixmap="nobody:nobody all"

Dans le fichier lcmaps.db

pepc = "lcmaps_c_pep.mod"

"--pep-daemon-endpoint-url https://margus.in2p3.fr:8154/authz"

"--resourceid http://authz-interop.org/xacml/resource/resource-type/arc"

"--actionid http://glite.org/xacml/action/execute"

"--capath /etc/grid-security/certificates/"

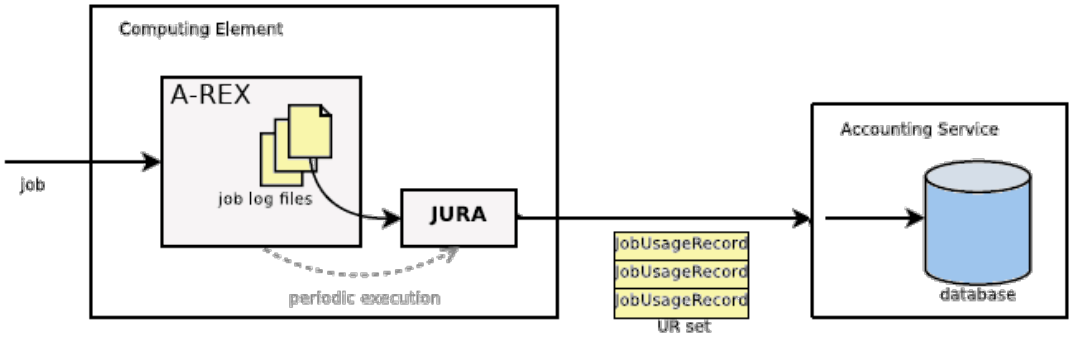
"--certificate /etc/grid-security/hostcert.pem"

"--key /etc/grid-security/hostkey.pem"

ARC - Accounting

A-REX – Execution service

Pour chaque job génère des logs.



JURA, job usage report of ARC

Génère « job usage records » UR

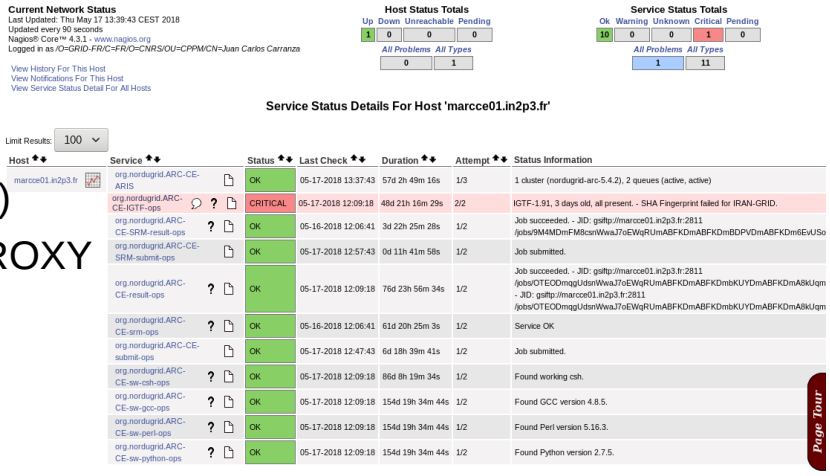
- Usage Record 2.0 (Computing Accounting Record) XML format
- Capable d'envoyer les enregistrements directement vers a SGAS service ou vers un APEL service.

Notre choix

- En reprenant le travail de F.Schaer – CEA
- Un script dans la crontab récupère chaque UR et le dépose dans une file de messages (MQ)
- Un service « apeldbloader » lit dans la MQ et insère chaque message dans la base de données de l'accounting national

ARC - Monitoring

- Déclarer le service
  - dans la local BDII
  - dans la GOC DB (only monitored)
- Install nordugrid-arc-nagios-plugins (wn's)
- Un environment /etc/arc/runtime/ENV/PROXY



Current Network Status
Last Updated: Thu May 17 13:39:43 CEST 2018
Updated every 90 seconds
Nagios® Core™ 4.3.1 - www.nagios.org
Logged in as /O=GRID-FR/C=FR/O=CNRS/OU=CPPM/CN=Juan Carlos Carranza

View History For This Host
View Notifications For This Host
View Service Status Detail For All Hosts

Host Status Totals

Up	Down	Unreachable	Pending
1	0	0	0

All Problems / All Types: 0 / 1

Service Status Totals

Ok	Warning	Unknown	Critical	Pending
10	0	0	1	0

All Problems / All Types: 1 / 11

Service Status Details For Host 'marcce01.in2p3.fr'

Limit Results: 100

Host	Service	Status	Last Check	Duration	Attempt	Status Information
marcce01.in2p3.fr	org.nordugrid.ARC-CE-ARIS	OK	05-17-2018 13:37:43	57d 2h 49m 16s	1/3	1 cluster (nordugrid-arc-5.4.2), 2 queues (active, active)
	org.nordugrid.ARC-CE-IGTF-ops	CRITICAL	05-17-2018 12:09:18	48d 21h 16m 29s	2/2	IGTF-1.91, 3 days old, all present. - SHA Fingerprint failed for IRAN-GRID.
	org.nordugrid.ARC-CE-SRM-result-ops	OK	05-16-2018 12:06:41	3d 22h 25m 28s	1/2	Job succeeded. - JID: gsiftp://marcce01.in2p3.fr:2811 /jobs/9M4MDmFM8csnWwaJ7oEWqRUmABFKDmABFKDmBDPVDmABFKDm6EvUSo
	org.nordugrid.ARC-CE-SRM-submit-ops	OK	05-17-2018 12:57:43	0d 11h 41m 58s	1/2	Job submitted.
	org.nordugrid.ARC-CE-result-ops	OK	05-17-2018 12:09:18	76d 23h 56m 34s	1/2	Job succeeded. - JID: gsiftp://marcce01.in2p3.fr:2811 /jobs/OTEODmqgUdsnWwaJ7oEWqRUmABFKDmABFKDmbKUYDmABFKDmA8kUqm - JID: gsiftp://marcce01.in2p3.fr:2811 /jobs/OTEODmqgUdsnWwaJ7oEWqRUmABFKDmABFKDmbKUYDmABFKDmA8kUqm
	org.nordugrid.ARC-CE-srm-ops	OK	05-16-2018 12:06:41	61d 20h 25m 3s	1/2	Service OK
	org.nordugrid.ARC-CE-submit-ops	OK	05-17-2018 12:47:43	6d 18h 39m 41s	1/2	Job submitted.
	org.nordugrid.ARC-CE-sw-csh-ops	OK	05-17-2018 12:09:18	86d 8h 19m 34s	1/2	Found working csh.
	org.nordugrid.ARC-CE-sw-gcc-ops	OK	05-17-2018 12:09:18	154d 19h 34m 44s	1/2	Found GCC version 4.8.5.
	org.nordugrid.ARC-CE-sw-perl-ops	OK	05-17-2018 12:09:18	154d 19h 34m 44s	1/2	Found Perl version 5.16.3.
	org.nordugrid.ARC-CE-sw-python-ops	OK	05-17-2018 12:09:18	154d 19h 34m 44s	1/2	Found Python version 2.7.5.

Page Tour

```
#!/bin/bash
x509_cert_dir="/etc/grid-security/certificates"
case $1 in
    0) mkdir -pv $joboption_directory/arc/certificates/
       cp -rv $x509_cert_dir/ $joboption_directory/arc
       cat ${joboption_controldir}/job.${joboption_gridid}.proxy \
           $joboption_directory/user.proxy
       ;;
    1) export X509_USER_PROXY=$RUNTIME_JOB_DIR/user.proxy
       export X509_USER_CERT=$RUNTIME_JOB_DIR/user.proxy
       export X509_CERT_DIR=$RUNTIME_JOB_DIR/arc/certificates
       ;;
    2) :
       ;;
esac
```

Des liens

Basic Install

https://www.gridpp.ac.uk/wiki/ARC_HTCondor_Basic_Install

Exemple Arc/Condor Cluster

https://www.gridpp.ac.uk/wiki/Example_Build_of_an_ARC/Condor_Cluster

Show how Liverpool runs multicore Jobs (Stephen Jones)

https://indico.cern.ch/event/467075/contributions/1143835/attachments/1236390/1815626/mc.pdf

How Liverpool adopted ARC / HTCondor Combo to build a Grid Cluster (Stephen Jones)

https://indico.cern.ch/event/467075/contributions/1143835/attachments/1236390/1815626/mc.pdf

Multicore job RAL (Andrew Lahiff, Alastair Dewhurst, John Kelly)

https://www.slideserve.com/hanzila/multi-core-jobs-at-the-ral-tier-1

Pour finir

- Mapping, Accounting
- Nagios ops ok, atlas ok
- LCG
  - Atlas en progrès
    - arcproxy issue job pilotes (solved)
    - Pilotes score/mcore ~ ok
  - Lhcb ....
- Dirac (rfc proxies, nommage des queues ARC)
- A faire (monitoring local)
- A comprendre (defrag .... réservation)
- Des choses a tester (cgroups)

Merci