DE LA RECHERCHE À L'INDUSTRIE

Kerberos & SLURM using Auks

- Tutorial -

www.cea.fr

Agenda

Understanding the concepts

- Kerberos principles
- Auks principles
- Auks SLURM Spank plugin principles

Applying the concepts

- Kerberos infrastructure setup
- Auks infrastructure setup
- SLURM configuration for kerberos support with Auks

Understanding the concepts

- kerberos principles

Kerberos principles

Kerberos V5 : description

- Network authentication protocol for un-trusted environments
  - Authentication of peers in un-trusted environments
- Provides mutual authentication
  - Authenticates both sides of a communication
- Based on a trusted third party per Realm
  - Key Distribution Center (KDC)
- Based on symmetric encryption (in regular usage)
  - Shared secrets between the KDC and the different trusted parties
- Provide Single Sign-On in un-trusted environments
  - One initial credential acquisition enable automatic access to kerberized services
- Provide federated authentication
  - Through cross-realm authentications

Kerberos principles

Kerberos V5 : specificities

- Expose key material with limited availability period
  - Relies on short lived credential
- Requires synchronized times between all peers
  - Validity period of credentials, replay attacks detection, ...
- Requires properly defined DNS configuration
  - Kerberos service « principals » (names) guessed from DNS reversed IP entries
  - Credentials associated to IP adresses according to DNS direct entries

Kerberos principles

Kerberos V5 : terms and components

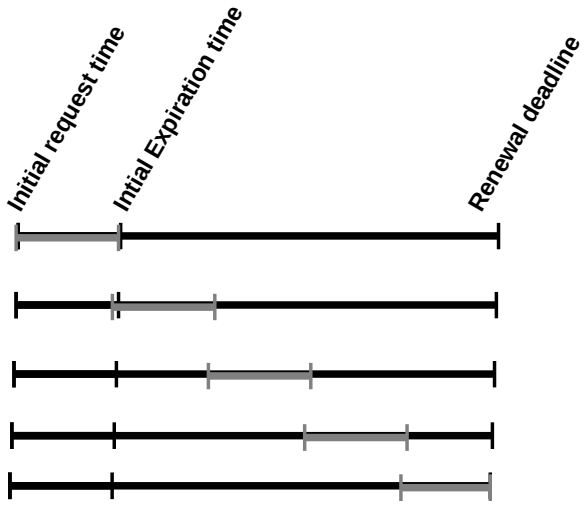
- Realm
  - Federation of peers and a trusted third party sharing a cryptographic secret with each of them
- Principal
  - Peer identity inside a realm
- Authentication Server (AS) *(Hosted by the KDC)*
  - Authenticate kerberos principals
  - Responsible for the AS_REQ/AS_REP kerberos exchange
    - TGT (Ticket Granting Ticket) delivery : short lived credentials for SSO
- Service Server (SS) *(Hosted by the KDC)*
  - Provides service tickets to authenticated peers
    - Those providing a valid TGT
  - Responsible for the TGS_REQ/TGS_REP kerberos exchange
    - TGS (Ticket Granting Service) delivery :
      short lived credentials to access services

Kerberos principles

Kerberos V5 : advanced ticket features

- Forwardable TGT
  - TGT enabling to acquire new TGTs
  - Enable Single Sign-On (SSO)

- Renewable tickets
  - Distinction between **validity time** and **renewable time**
    - **initial request time** + **validity time** = **expirarion time**
    - **validity time** lower or equal to **renewable time**
    - Exp : 1 day ticket renewable a week
    - **expiration time** inherited by TGS and forwarded TGT
  - Enable to extend the availability period of a credential by steps
    - Using a particular request to the KDC before « expiration time »
    - Up to **initial request time** + **renewable time**
  - Ensure that a lost ticket retrieved after the **expiration time** is no longer usable

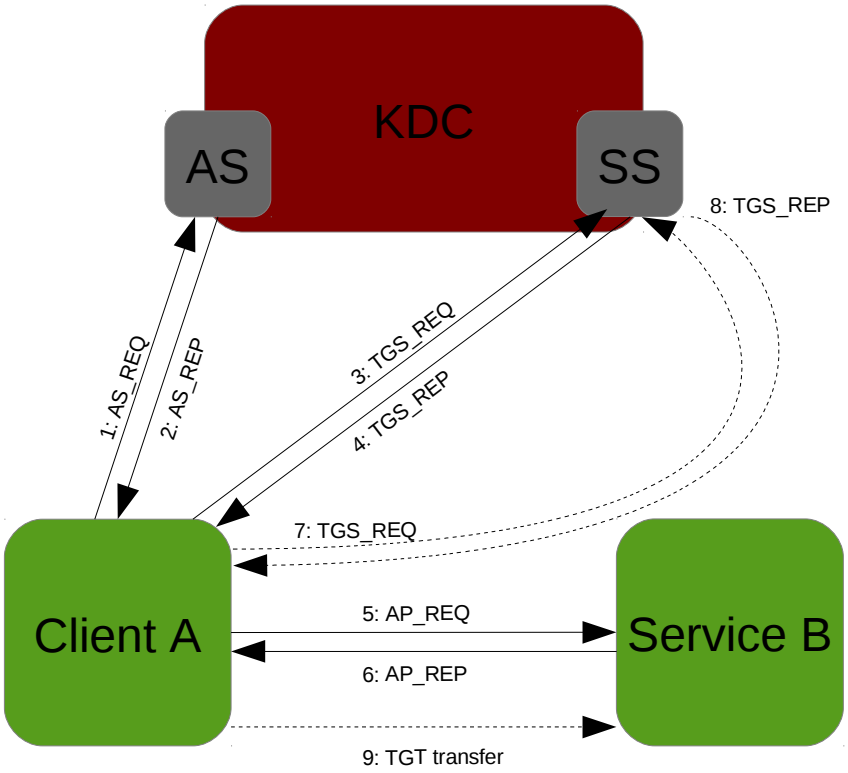


- Adressless tickets (TGT/TGS)
  - Tickets are bound to requester IP adresses by default
    - Kerberos services do not always check that field
  - Adressless tickets are not bound to any IP adresses
    - Useful when using kerberos behind a NAT

Kerberos principles

Kerberos V5 protocol overview

- Authentication stage
  - Stage 1
    - AS_REQ to request a TGT (with encrypted preauth data to prove the identity of the requester)
  - Stage 2
    - AS_REP to get a TGT encrypted with the client shared key
- Service ticket request
  - Stage 3
    - TGS_REQ to request a TGS for the specific service « Service B »
  - Stage 4
    - TGS_REP to get a TGS encrypted with the TGT session key
- Application access request
  - Stage 5
    - AP_REQ to request a secured channel with the service
  - Stage 6
    - AP_REP to finalize the secure channel establishment with mutual authentication
- Credential forwarding (Optional, required for SSO)
  - Stage 7
    - TGS_REQ to request a TGT valid on « Service B » host
  - Stage 8
    - TGS_REP to get the forwarded TGT encrypted with the TGT session key
  - Stage 9
    - Transfer of the forwarded TGT over the secure channel



Kerberos principles

Kerberos V5 ecosystem

- Available for different platforms with different implementations
  - **UNIX, Linux-based systems** : MIT, Heimdal
  - Windows : Windows Active Directory implements a kerberos like/compatible protocol
  - …
- Local area network as the primary target
  - But larger setup exist
- Multiple kerberized services available on Linux
  - Exp : OpenSSH, LDAP, …
- Multiple kerberized Distributed File System
  - Exp : OpenAFS, NFSv3, NFSv4, NFSv4.x, Lustre !

Kerberos principles

Kerberos V5 interests in HPC environments

- Ease users connections to compute services
  - Workstation to login node seamless access
- Ease user connections from login node to allocated compute nodes
  - Monitoring
  - Debugging
  - Exotic MPI launcher
  - ...
- Secured access to provided services
  - Data staging (outside and/or inside the clusters)
  - Remote connections
  - ...

Kerberos principles

Kerberos V5 concerns in HPC environments

- Credential life cycle management
  - Defining the common session time for a HPC site
  - Ensuring the renewal of tickets in time
- Batch mode
  - Ensuring kerberized executions when no user directly involved
- Scalability
  - Trusted third party behavior with thousands of active nodes
  - Credential forwarding strategies with thousands of peers
- Integration
  - Ensuring kerberos support in HPC software stacks

Understanding the concepts

- Auks principles

Auks principles

Auks main objectives

- Provide kerberos credential support in non-interactive environments
  - Batch environment, CRON, ...
- Provide kerberos credential support for HPC environments
  - Large installations with large number of components
  - Ease Auks integration in Batch systems
    - Built-in support for SLURM through a dedicated SPANK plugin
      - Primary target
    - Command line client for other batch systems or usages
      - Exp : AUKS/GridEngine integration in Stanford FarmShare

Auks principles

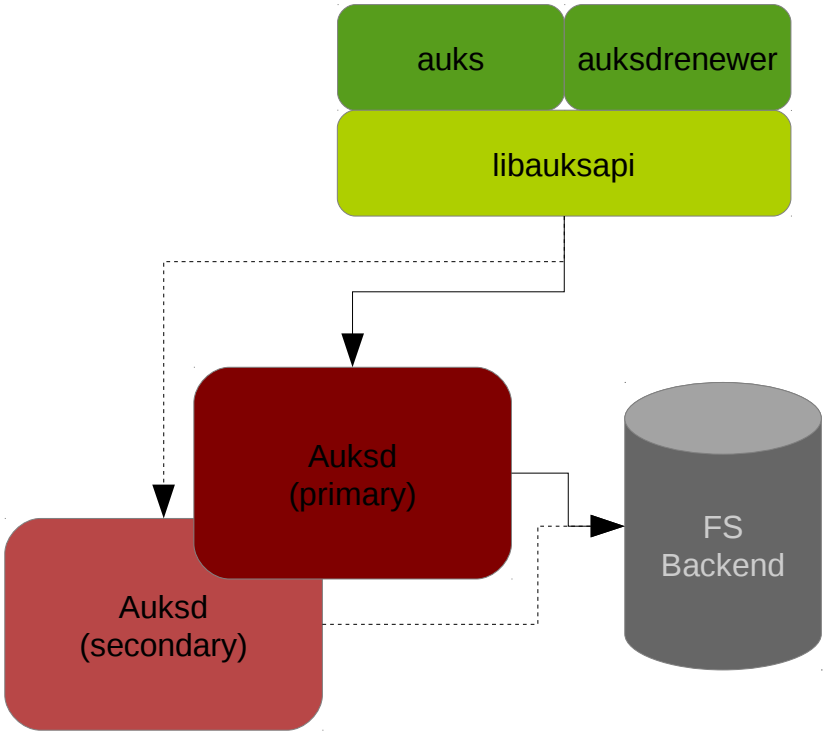
Auks : description

- Distributed credential delegation system
  - Remote cache of kerberos credentials
    - Used to push or pull credentials
  - Regular renewal of cached tickets
    - for end-to-end life cycle usability of tickets
  - Client/Server application
    - Kerberized Service to ensure the authentication and privacy of the exchanges
- External Linux tool
  - Easily integrated in external Apps (C-API, Command line clients)
  - Developped and tested on CentOS, RedHat, Fedora
- Not an authentication/authorization system
- OpenSource project
  - https://sourceforge.net/projects/auks/

Auks principles

Auks overview

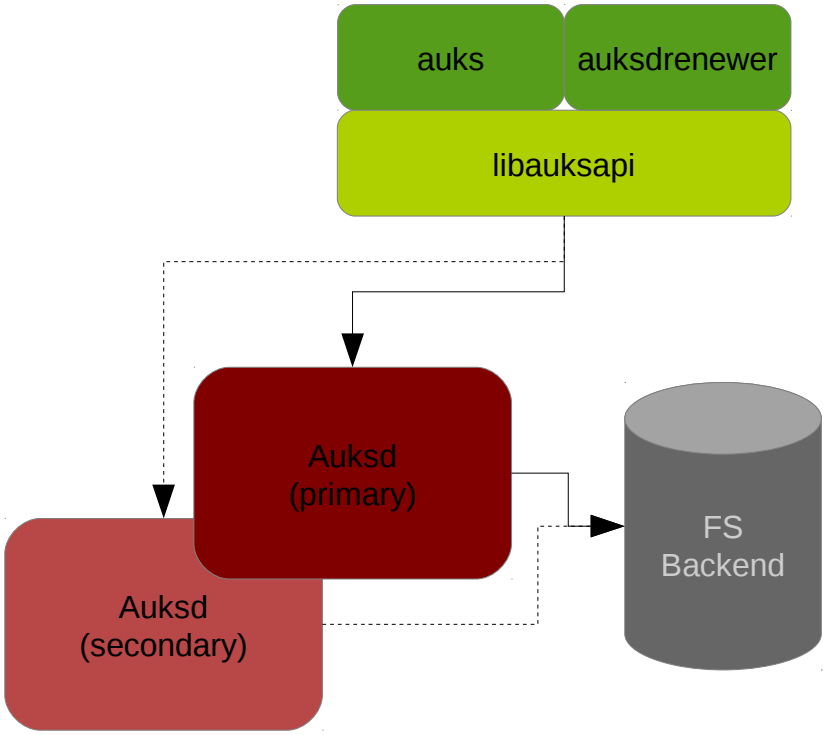
- Auksd, the central daemon
  - Multi-thread server written in C
  - Kerberized service
    - Require a kerberos keytab
    - NAT awareness (if configured)
  - Authenticate client requests
    - Using associated kerberos principal
  - Serve add/get/remove/dump TGT requests
    - After authorization using Auks's ACL
  - Stores users TGT in a FS directory
    - for persistence
    - At most one TGT per user
    - Principal/uid mapping on server side
  - Cache TGT in memory
    - to speed-up retrieval
  - Get requests providing **uid**
    - Avoid to guess the principal to request when used with cross-realm
  - HA using an external tool
    - No internal mechanism yet



Auks principles

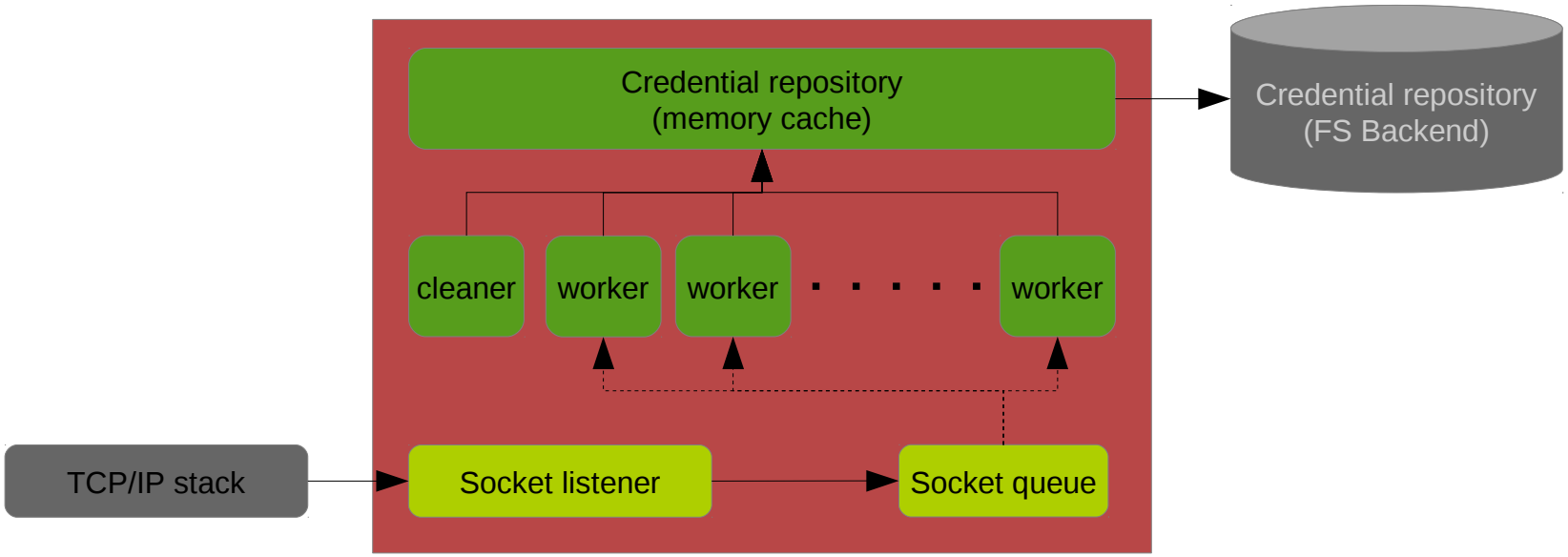
Auks overview

- Libauksapi
  - Automatic switch to backup server in case of failure
  - Configurable timeouts, retry delays and retries amount
  - Automatically get addressless TGTs to process add requests
    - Cached tickets usable from any hosts
- Auks
  - Simple program wrapping and configuring the API calls
  - Require a valid TGT in client environment to succeed
- Auksdrenewer
  - Implementation of the Auksd renewal mechanism
  - Externalized due to thread safety issues in initial kerberos libraries used
  - Allowed to dump auksd TGT cache



Auks principles

Auksd internals



Auks principles

Auks authorization

- authorization rules defined by ACL
  - Based on
    - Requester kerberos principal
    - Requester host
  - Determine requesters role/privilege
    - Guest : add request for personal credential only
    - User : add/get/remove requests for personal credential only
    - Admin : add/get/remove/dump requests for any credential

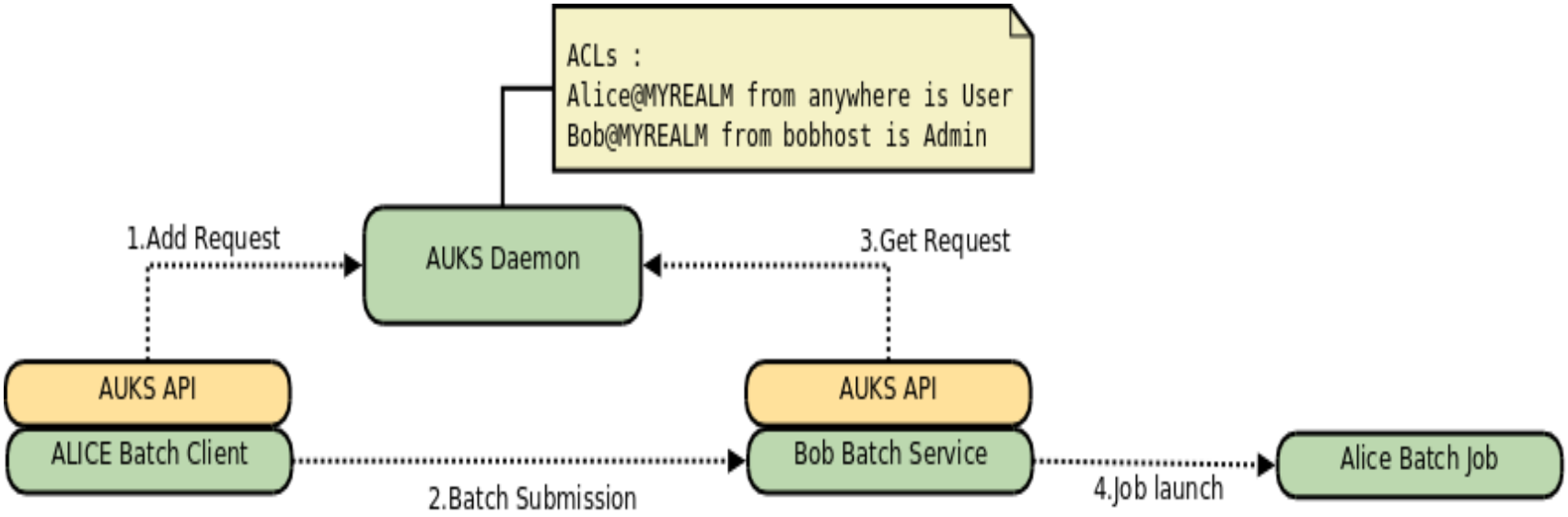
Auks features

- Scalability
  - Single adressless ticket managed per user
  - Retrieved by each involved compute node using a highly parallel server
    - Several thousands « get » requests per second
- Everlasting jobs
  - Using Auks ticket renewal mechanism (new get to the Auksd, instead of KDC req)
  - Long running jobs as long as users refresh the credential stored in auks

Auks principles

Auks usage example scenario

- Users add their credentials to the remote cache
- Users request their batch execution
- Auksdrenewer/Auksd renew the credentials waiting for the associated executions
- Batch system with admin privilege retrieve the credential using Auksd
- Batch system set the credential in the user env and start the execution
- The batch execution can renew the credential using Auksd (if user privilege)
  - Avoid to contact the external KDC with massively parallel/simultaneous requests



Understanding the concepts

- Auks Spank plugin principles

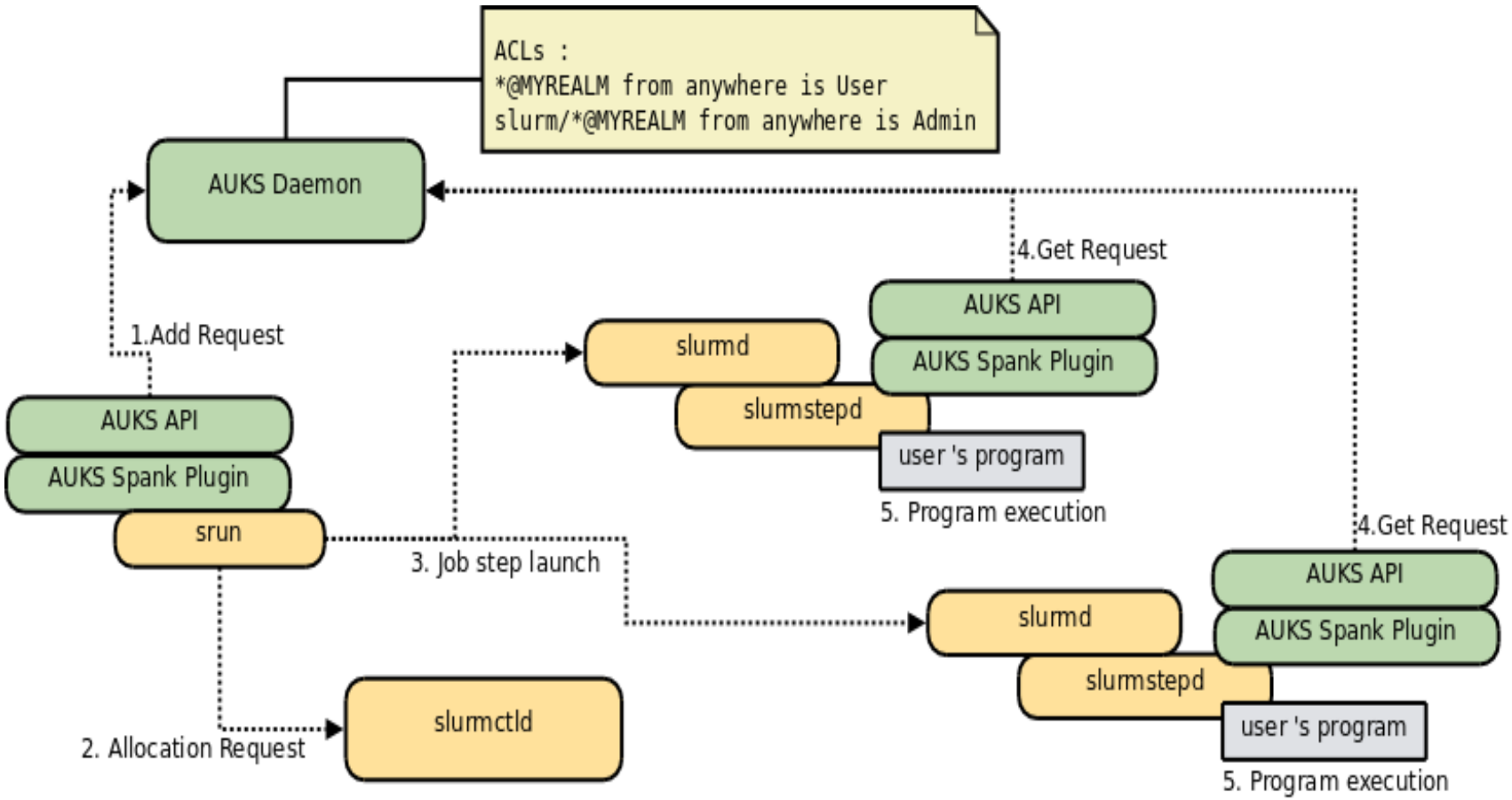
Auks SLURM Spank plugin principles

Auks SPANK plugin description

- SLURM SPANK API
  - Provides hooks to perform various actions at different stages of job/step life cycles
- Auks client embedded in a SPANK plugin for SLURM
  - User side
    - auks « user » privilege required
    - « Add » request at submission time
    - « Get » requests during execution
  - Slurmd side
    - Auks « admin » privilege required
    - « Get »requests at the very begining of execution
      - to set up a kerberized env for the user
  - 1/N strategy
    - 1 « add »request per submission/allocation
    - N « get » requests, 1 per allocated node
  - Stackable
    - Consecutive SPANK plugins can reuse the kerberos ticket
      - Slurm-spank-X11 for internal ssh connections
        https://github.com/hautreux/slurm-spank-x11

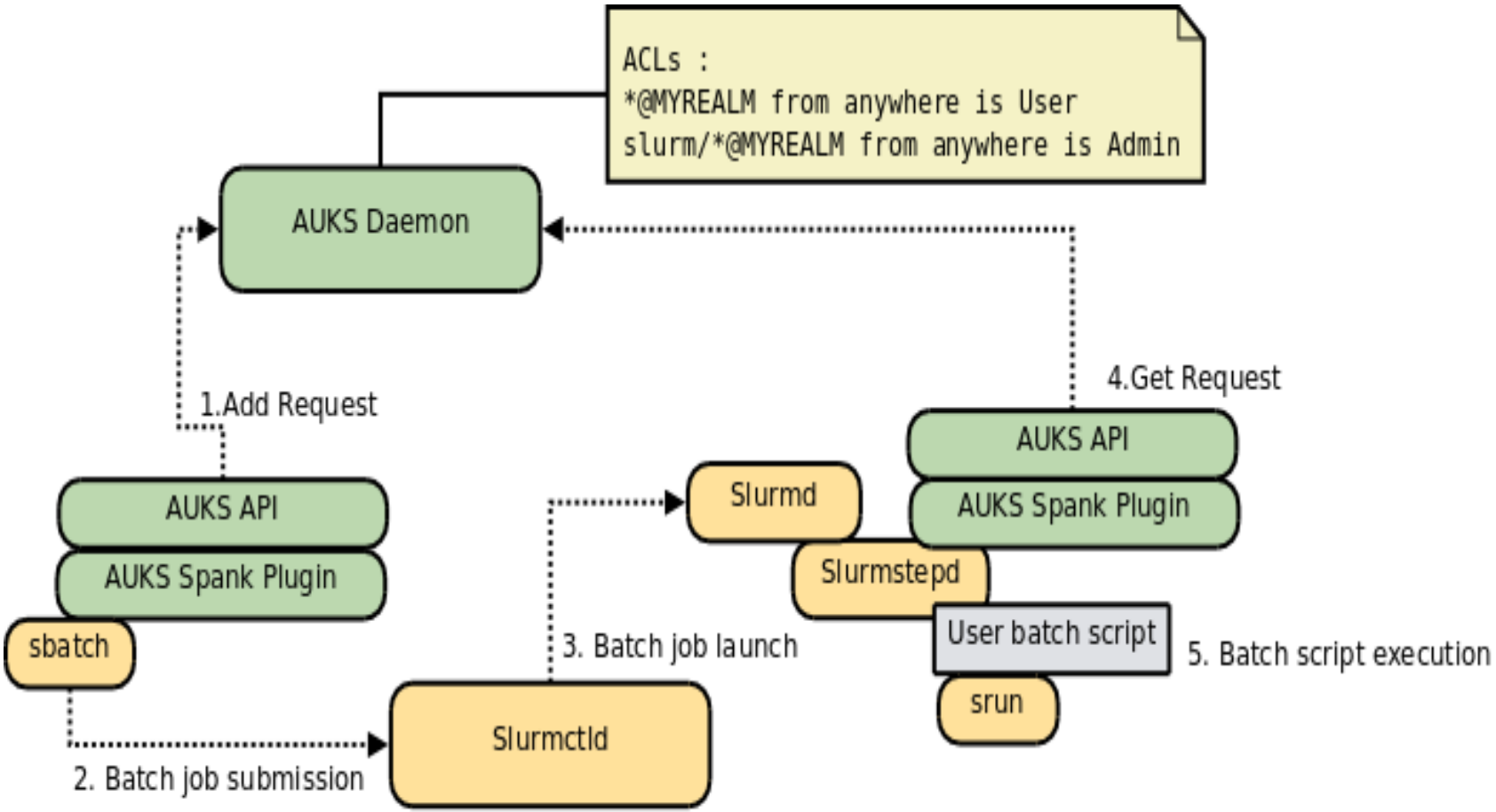
Auks SLURM Spank plugin principles

Auks SPANK plugin : srun scenario



Auks SLURM Spank plugin principles

Auks SPANK plugin : sbatch scenario



Auks SLURM Spank plugin principles

Feedback

- Used on Tera100 and PRACE Curie machine
  - ~4k nodes and ~5.5k nodes each
  - 1 single auksd server with 1000 worker threads per cluster
    - Used for « add » / « intial get » / « renewal get » requests
  - In production since 2009
  - Current production version : 0.4.0
- Usage
  - Mostly for data staging in jobs (remote scp)
  - Internal ssh connections (X11 tunnel setup with slurm-spank-x11)
  - Not yet used for FS access
    - Planned for the near future

Auks SLURM Spank plugin principles

Limitations

- Every compute node has the auks « admin » privilege
  - allowed to acquire any ticket using « auks »
  - Would require major modifications in SLURM internals to change that
- Scalability issue with a very large amount of nodes
  - Not sure to manage properly several 10k « get » requests
  - Would require major modifications in SLURM internals to
    - Acquire one ticket at execution start
    - Propagate it securely to all the involved nodes (like sbcast)
- Scalability issue of Kerberos infrastructure when TGT are used in parallel by all the nodes
  - TGS request from every allocated nodes to access the kerberized FS
    - TGS prefetching and caching using Auks is planned to cope with that
  - Not only a AUKS SPANK plugin problem but a generic one with kerberos at scale

Applying the concepts

Applying the concepts

Assumptions

- RedHat like Linux system
  - If you are using something else, you are smart enough to know how to deal with the conversion :)
- MIT Kerberos implementation
  - Auks not supported/tested with Heimdal implementation
  - Basic/Default configuration will be used when possible
    - Kerberos is not the focus of this presentation
- Only a single kerberos Realm is used
  - Simpler to setup in a few minutes
  - Auks properly work with multiple realms and cross-realm relations
- A single laptop as the client, server, SLURM login and compute nodes
  - Sufficient to reproduce the classical scenarios
  - Avoid time synchornization and DNS issues
  - Everyone who want to try should be able to do it during this presentation
    - assuming an existing SLURM setup on your laptop... But that is certainly the case :)

Applying the concepts

- Kerberos infrastructure setup

Kerberos infrastructure setup

Installation

- RPM packages required
  - Client side : krb5-workstation
  - Server side : krb5-workstation, krb5-server
  - Development side (to compile Auks) : krb5-devel

Configuration

- Configuration files
  - Server side : */var/kerberos/kdc.conf*
  - Client side : */etc/krb5.conf*

```
[root@leaf ~]# vim /var/kerberos/krb5kdc/kdc.conf
[root@leaf ~]# cat  /var/kerberos/krb5kdc/kdc.conf
[kdcdefaults]
 kdc_ports = 88
 kdc_tcp_ports = 88

[realms]
 TREE.ORG = {
  acl_file = /var/kerberos/krb5kdc/kadm5.acl
  dict_file = /usr/share/dict/words
  admin_keytab = /var/kerberos/krb5kdc/kadm5.keytab
  supported_enctypes = aes256-cts:normal aes128-cts:normal
  max_renewable_life = 7d
 }
[root@leaf ~]#
```

```
[root@leaf ~]# vim /etc/krb5.conf
[root@leaf ~]# cat /etc/krb5.conf
[logging]
 default = FILE:/var/log/krb5libs.log
 kdc = FILE:/var/log/krb5kdc.log
 admin_server = FILE:/var/log/kadmind.log
[libdefaults]
 default_realm = TREE.ORG
 dns_lookup_realm = false
 dns_lookup_kdc = false
 ticket_lifetime = 24h
 renew_lifetime = 7d
 forwardable = true
 noaddresses = false
 preferred_preauth_types = "17, 16 15, 14"
[realms]
 TREE.ORG = {
  kdc = leaf.tree.org:88
  admin_server = leaf.tree.org
 }
[domain_realm]
 .tree.org = TREE.ORG
 tree.org = TREE.ORG
[root@leaf ~]#
```

Kerberos infrastructure setup

Initialization

- Kerberos DB initialization
- Kerberos KDC initial start
- First principals creation
  - Including host keytab creation : */etc/krb5.keytab*

```
[root@leaf ~]# kdb5_util create -s
Loading random data
Initializing database '/var/kerberos/krb5kdc/principal' for realm 'TREE.ORG',
master key name 'K/M@TREE.ORG'
You will be prompted for the database Master Password.
It is important that you NOT FORGET this password.
Enter KDC database master key:
Re-enter KDC database master key to verify:
[root@leaf ~]# service krb5kdc start
Starting krb5kdc (via systemctl):                          [  OK  ]
[root@leaf ~]# kadmin.local
Authenticating as principal root/admin@TREE.ORG with password.
kadmin.local:  ank -randkey +requires_preauth host/leaf.tree.org@TREE.ORG
WARNING: no policy specified for host/leaf.tree.org@TREE.ORG; defaulting to no policy
Principal "host/leaf.tree.org@TREE.ORG" created.
kadmin.local:  ktadd -k /etc/krb5.keytab host/leaf.tree.org@TREE.ORG
Entry for principal host/leaf.tree.org@TREE.ORG with kvno 2, encryption type aes256-cts-hmac-sha1-96 added to keytab WRFILE:/etc/krb5.keytab.
Entry for principal host/leaf.tree.org@TREE.ORG with kvno 2, encryption type aes128-cts-hmac-sha1-96 added to keytab WRFILE:/etc/krb5.keytab.
kadmin.local:  ank +requires_preauth mat
WARNING: no policy specified for mat@TREE.ORG; defaulting to no policy
Enter password for principal "mat@TREE.ORG":
Re-enter password for principal "mat@TREE.ORG":
Principal "mat@TREE.ORG" created.
kadmin.local:  quit
[root@leaf ~]#
```

Kerberos infrastructure setup

Validation

- OpenSSH configuration
  - GSSAPI Authentication (the SSO part of the kerberos authentication in SSH)
    - With Credential delegation (For cascading SSO)
    - With Credential cleanup
- Client credential initialization
- OpenSSH connection
  - Using GSSAPI

```
[root@leaf ~]# vim /etc/ssh/sshd_config
[root@leaf ~]# vim /etc/ssh/ssh_config
[root@leaf ~]# grep GSSAPI /etc/ssh/sshd_config | egrep -v "^#"
GSSAPIAuthentication yes
GSSAPICleanupCredentials yes
[root@leaf ~]# grep GSSAPI /etc/ssh/ssh_config | egrep -v "^#"
GSSAPIDelegateCredentials yes
GSSAPIAuthentication yes
[root@leaf ~]# service sshd restart
Restarting sshd (via systemctl):                           [  OK  ]
[root@leaf ~]#
```

```
[mat@leaf ~]$ kinit
Password for mat@TREE.ORG:
[mat@leaf ~]$ klist
Ticket cache: FILE:/tmp/krb5cc_500
Default principal: mat@TREE.ORG

Valid starting     Expires            Service principal
09/21/12 17:12:21  09/22/12 17:12:19  krbtgt/TREE.ORG@TREE.ORG
                   renew until 09/28/12 17:12:21
[mat@leaf ~]$ ssh leaf klist
Ticket cache: FILE:/tmp/krb5cc_500_ktKqRf2319
Default principal: mat@TREE.ORG

Valid starting     Expires            Service principal
09/21/12 17:12:29  09/22/12 17:12:19  krbtgt/TREE.ORG@TREE.ORG
                   renew until 09/28/12 17:12:21
[mat@leaf ~]$ klist
Ticket cache: FILE:/tmp/krb5cc_500
Default principal: mat@TREE.ORG

Valid starting     Expires            Service principal
09/21/12 17:12:21  09/22/12 17:12:19  krbtgt/TREE.ORG@TREE.ORG
                   renew until 09/28/12 17:12:21
09/21/12 17:12:29  09/22/12 17:12:19  host/leaf.tree.org@TREE.ORG
                   renew until 09/28/12 17:12:21
[mat@leaf ~]$
```

Kerberos infrastructure setup

How it worked

- Authentication stage

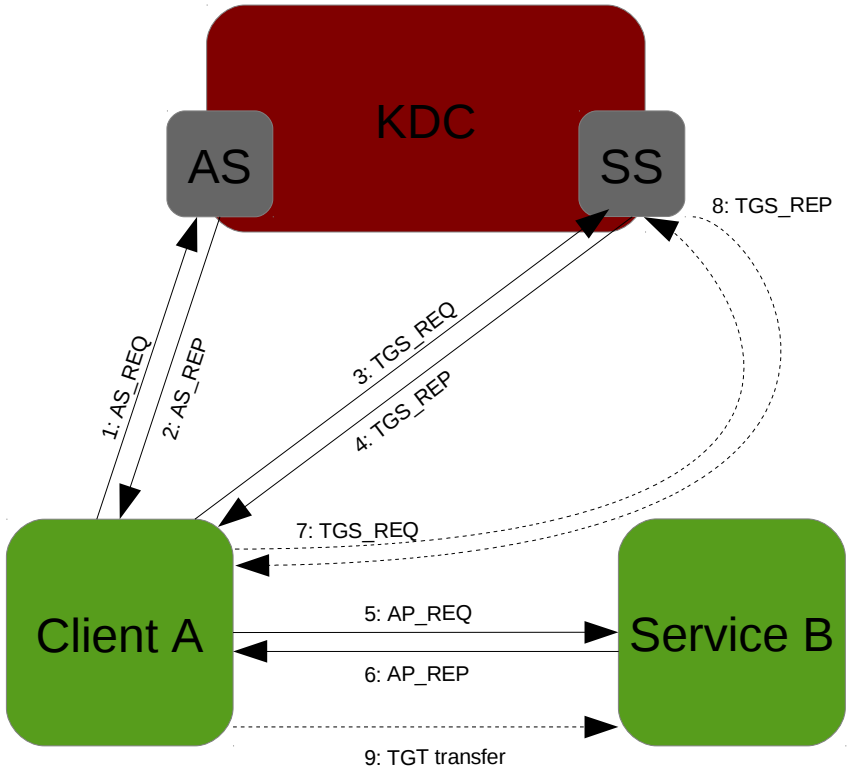
```
bash-3.2$ kinit
Password for mat@TREE.ORG:
bash-3.2$ klist
...
Valid starting     Expires          Service principal
09/21/12 17:12:21  09/22/12 17:12:19  krbtgt/TREE.ORG@TREE.ORG
                           renew until 09/28/12 17:12:21
...
bash-3.2$
```

- Service ticket request
  - Not required in real scenario (automatic)

```
bash-3.2$ kvno host/leaf.tree.org
host/leaf.tree.org@TREE.ORG: kvno = 2
bash-3.2$ klist
...
09/21/12 17:12:27  09/22/12 17:12:19  host/leaf.tree.org@TREE.ORG
                           renew until 09/28/12 17:12:21
...
bash-3.2$
```

- Application access request
- credential forwarding

```
bash-3.2$ ssh leaf.tree.org klist
...
Valid starting     Expires          Service principal
09/21/12 17:12:29  09/22/12 17:12:19  krbtgt/TREE.ORG@TREE.ORG
                           renew until 09/28/12 17:12:21
...
bash-3.2$
```



Kerberos infrastructure setup

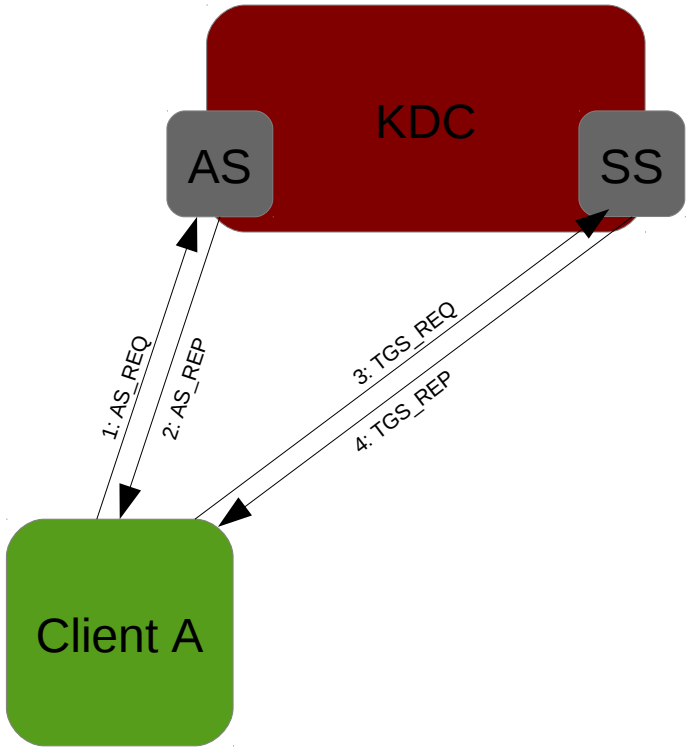
Other interesting commands

- TGT renewal

```
bash-3.2$ klist
...
Valid starting     Expires            Service principal
09/21/12 23:47:29  09/22/12 23:47:27  krbtgt/TREE.ORG@TREE.ORG
                   renew until 09/28/12 23:47:27
...
bash-3.2$ kinit -R
bash-3.2$ klist
...
Valid starting     Expires            Service principal
09/21/12 23:47:35  09/22/12 23:47:33  krbtgt/TREE.ORG@TREE.ORG
                   renew until 09/28/12 23:47:27
...
bash-3.2$
```

- Adressless tickets retrieval

```
bash-3.2$ kinit
Password for mat@TREE.ORG:
bash-3.2$ klist -a
...
Valid starting     Expires            Service principal
09/21/12 23:49:23  09/22/12 23:49:20  krbtgt/TREE.ORG@TREE.ORG
                   renew until 09/28/12 23:49:20
                   Addresses: leaf.tree.org
...
bash-3.2$ kinit -A
Password for mat@TREE.ORG :
bash-3.2$ klist -a
...
Valid starting     Expires            Service principal
09/21/12 23:50:34  09/22/12 23:50:32  krbtgt/TREE.ORG@TREE.ORG
                   renew until 09/28/12 23:50:32
                   Addresses: (none)
...
bash-3.2$
```



Applying the concepts

- Auks infrastructure setup

Auks infrastructure setup

Installation

- Download at http://http://sourceforge.net/projects/auks/
  - Then build RPM packages (or use ./configure ; make ; make install)

- RPM packages required
  - Client/Server side : auks
  - Login/compute nodes : auks, auks-slurm

```
[mat@leaf auks]$ rpmbuild -ta auks-0.4.0.tar.gz
...
Wrote: /home/mat/rpmbuild/SRPMS/auks-0.4.0-1.src.rpm
Wrote: /home/mat/rpmbuild/RPMS/x86_64/auks-0.4.0-1.x86_64.rpm
Wrote: /home/mat/rpmbuild/RPMS/x86_64/auks-devel-0.4.0-1.x86_64.rpm
Wrote: /home/mat/rpmbuild/RPMS/x86_64/auks-slurm-0.4.0-1.x86_64.rpm
...
[mat@leaf auks]$

[root@leaf x86_64]# rpm -i auks-0.4.0-1.x86_64.rpm auks-slurm-0.4.0-1.x86_64.rpm
...
[root@leaf ~]#
```

Auks infrastructure setup

Configuration

- Client / Server side
  - Common configuration
  - Server configuration
  - */etc/auks/auks.conf*
- Server only
  - ACL rules
    - Roles definition
  - */etc/auks/auks.acl*

```
[root@leaf ~]# cp /etc/auks/auks.acl.example /etc/auks/auks.acl
[root@leaf ~]# emacs -nw /etc/auks/auks.acl
[root@leaf ~]# diff /etc/auks/auks.acl.example /etc/auks/auks.acl
5a6,16
> rule {
>         principal = ^host/leaf.tree.org@TREE.ORG$ ;
>         host = * ;
>         role = admin ;
> }
> rule {
>         principal = ^[[:alnum:]]*@TREE.ORG$ ;
>         host = * ;
>         role = user ;
> }
>
[root@leaf ~]#
```

```
[root@leaf ~]# cp /etc/auks/auks.conf.example /etc/auks/auks.conf
[root@leaf ~]# emacs -nw /etc/auks/auks.conf
[root@leaf ~]# diff /etc/auks/auks.conf.example /etc/auks/auks.conf
12c12
<  PrimaryHost       =               "auks" ;
---
>  PrimaryHost       =               "leaf.tree.org" ;
15c15
<  PrimaryPrincipal   = "host/auks.myrealm.org@MYREALM.ORG" ;
---
>  PrimaryPrincipal   = "host/leaf.tree.org@TREE.ORG" ;
18c18
<  SecondaryHost     =               "auks2" ;
---
>  #SecondaryHost     = "auks2" ;
20,21c20,21
<  SecondaryPort     =               "12345" ;
<  SecondaryPrincipal =  "host/auks2.myrealm.org@MYREALM.ORG" ;
---
>  #SecondaryPort     =  "12345" ;
>  #SecondaryPrincipal = "host/auks2.myrealm.org@MYREALM.ORG" ;
67c67
<  LogLevel          =               "1" ;
---
>  LogLevel          =               "2" ;
77c77
<  ACLFile           =               "/etc/auks/auksd.acl" ;
---
>  ACLFile           =               "/etc/auks/auks.acl" ;
[root@leaf ~]#
```

Auks infrastructure setup

Initialization & validation

- Auks service startup
- Auks service test
  - As a user

```
[root@leaf ~]# service auksd start
Starting auksd (via systemctl):                            [  OK  ]
[root@leaf ~]# tail -f -n4 /var/log/auksd.log
Sat Sep 22 23:06:12 2012 [INFO1] [euid=0,pid=7380] auksd     : 11/11 workers launched
Sat Sep 22 23:06:12 2012 [INFO1] [euid=0,pid=7380] dispatcher: auksd stream created on leaf.tree.org:12345 (fd is 1)
Sat Sep 22 23:06:12 2012 [INFO1] [euid=0,pid=7380] dispatcher: socket 1 listening queue successfully specified
Sat Sep 22 23:06:12 2012 [INFO2] [euid=0,pid=7380] worker[0] : auks cred repo cleaned in ~0s (0 creds removed)
```

```
[mat@leaf auks]$ kinit
Password for mat@TREE.ORG:
[mat@leaf auks]$ auks -v
Auks API request succeed
[mat@leaf auks]$
```

```
[root@leaf ~]# tail -n1 /var/log/auksd.log
Sat Sep 22 23:06:47 2012 [INFO2] [euid=0,pid=7380] worker[7] : mat@TREE.ORG from 192.168.0.14 : ping request succeed
```

```
[mat@leaf auks]$ auks -a
Auks API request succeed
[mat@leaf auks]$
```

```
[root@leaf ~]# ls /var/cache/auks/
aukscc_500
[root@leaf ~]#
```

Applying the concepts

- SLURM configuration for kerberos support with Auks

SLURM configuration for kerberos support with Auks

Configuration & Initialization

- Login/Compute nodes
  - Auks SPANK plugin configuration
  - */etc/slurm/plugstack.conf.d/auks.conf*

```
[root@leaf ~]# cp /etc/slurm/plugstack.conf.d/auks.conf.example /etc/slurm/plugstack.conf.d/auks.conf
[root@leaf ~]# emacs -nw /etc/slurm/plugstack.conf.d/auks.conf
[root@leaf ~]# diff -u /etc/slurm/plugstack.conf.d/auks.conf.example /etc/slurm/plugstack.conf.d/auks.conf
--- /etc/slurm/plugstack.conf.d/auks.conf.example                2012-09-22 22:42:22.000000000 +0200
+++ /etc/slurm/plugstack.conf.d/auks.conf                        2012-09-22 23:19:01.071361060 +0200
@@ -37,4 +37,4 @@
 # preventing the Auks plugin to put agin the credential on the auks server.
 #
 #-------------------------------------------------------------------------
-#optional auks.so default=disabled spankstackcred=no minimum_uid=0
+optional auks.so default=disabled spankstackcred=no minimum_uid=500
[root@leaf ~]#


[root@leaf ~]# emacs -nw /etc/slurm/slurm.conf
[root@leaf ~]# grep -i plugstack /etc/slurm/slurm.conf
PlugStackConfig=/etc/slurm/plugstack.conf.d/auks.conf
[root@leaf ~]#
[root@leaf ~]# service slurm restart
Restarting slurm (via systemctl):                          [  OK  ]
[root@leaf ~]#
```

SLURM configuration for kerberos support with Auks

Validation

```
[mat@leaf auks]$ kinit
Password for mat@TREE.ORG:
[mat@leaf auks]$ srun --auks=yes klist
Ticket cache: FILE:/tmp/krb5cc_500_17_m1q54v
Default principal: mat@TREE.ORG

Valid starting     Expires           Service principal
09/22/12 23:21:48  09/23/12 23:06:41  krbtgt/TREE.ORG@TREE.ORG
        renew until 09/29/12 23:06:41
[mat@leaf auks]$
```

```
[root@leaf ~]# tail -n2 /var/log/auksd.log
Sat Sep 22 23:21:49 2012 [INFO2] [euid=0,pid=7380] worker[4] : mat@TREE.ORG from 192.168.0.14 : add request succeed
Sat Sep 22 23:21:49 2012 [INFO2] [euid=0,pid=7380] worker[7] : host/leaf.tree.org@TREE.ORG from 192.168.0.14 : get request succeed
```

```
[mat@leaf auks]$ srun --auks=done klist
Ticket cache: FILE:/tmp/krb5cc_500_18_VRhpzq
Default principal: mat@TREE.ORG

Valid starting     Expires           Service principal
09/22/12 23:21:48  09/23/12 23:06:41  krbtgt/TREE.ORG@TREE.ORG
        renew until 09/29/12 23:06:41
[mat@leaf auks]$
```

```
[root@leaf ~]# tail -n2 /var/log/auksd.log
Sat Sep 22 23:21:49 2012 [INFO2] [euid=0,pid=7380] worker[7] : host/leaf.tree.org@TREE.ORG from 192.168.0.14 : get request succeed
Sat Sep 22 23:22:49 2012 [INFO2] [euid=0,pid=7380] worker[1] : host/leaf.tree.org@TREE.ORG from 192.168.0.14 : get request succeed
```

SLURM configuration for kerberos support with Auks

Validation

```
[mat@leaf auks]$ kdestroy
[mat@leaf auks]$ klist
klist: No credentials cache found (ticket cache FILE:/tmp/krb5cc_500)
[mat@leaf auks]$

[mat@leaf auks]$ srun ssh -oBatchMode=yes leaf.tree.org hostname
Permission denied (publickey,gssapi-keyex,gssapi-with-mic,password).
srun: error: leaf10: task 0: Exited with exit code 255

[mat@leaf auks]$ srun --auks=done ssh -oBatchMode=yes leaf.tree.org hostname
leaf
[mat@leaf auks]$

[mat@leaf auks]$ srun --auks=done ssh -oBatchMode=yes leaf.tree.org klist
Ticket cache: FILE:/tmp/krb5cc_500_QdfxD10995
Default principal: mat@TREE.ORG

Valid starting     Expires            Service principal
09/23/12 00:06:57  09/23/12 23:06:41  krbtgt/TREE.ORG@TREE.ORG
                   renew until 09/29/12 23:06:41
[mat@leaf auks]$
```

Thank you for your attention

Questions ?

Commissariat à l'énergie atomique et aux énergies alternatives
Centre DAM Ile-de-France | Bruyères-le-Châtel 91297 Arpajon Cedex
T. +33 (0)1 69 26 40 00 |
Etablissement public à caractère industriel et commercial | RCS Paris B 775 685 019

DAM/DIF
DSSI
SISR