Grid Certificate & VOMS

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Outline

1. **Introduction of the Grid certificate structure,**
2. **How to apply for a personal CA,**
3. **How to register VOMS,**
4. **Create a DIRAC-proxy.**

Introduction

The Grid Authentication Model,

- JUNO DCI provides distributed computing and storage resources.
- Every resource has its own local user lists.
- The Grid certificate is a personal certification system for DCI users using distributed resources by mapping Grid users to local user pool.

For Users,

- A CA certificate, used for provide your personal information. You need use it to prove you are yourself.

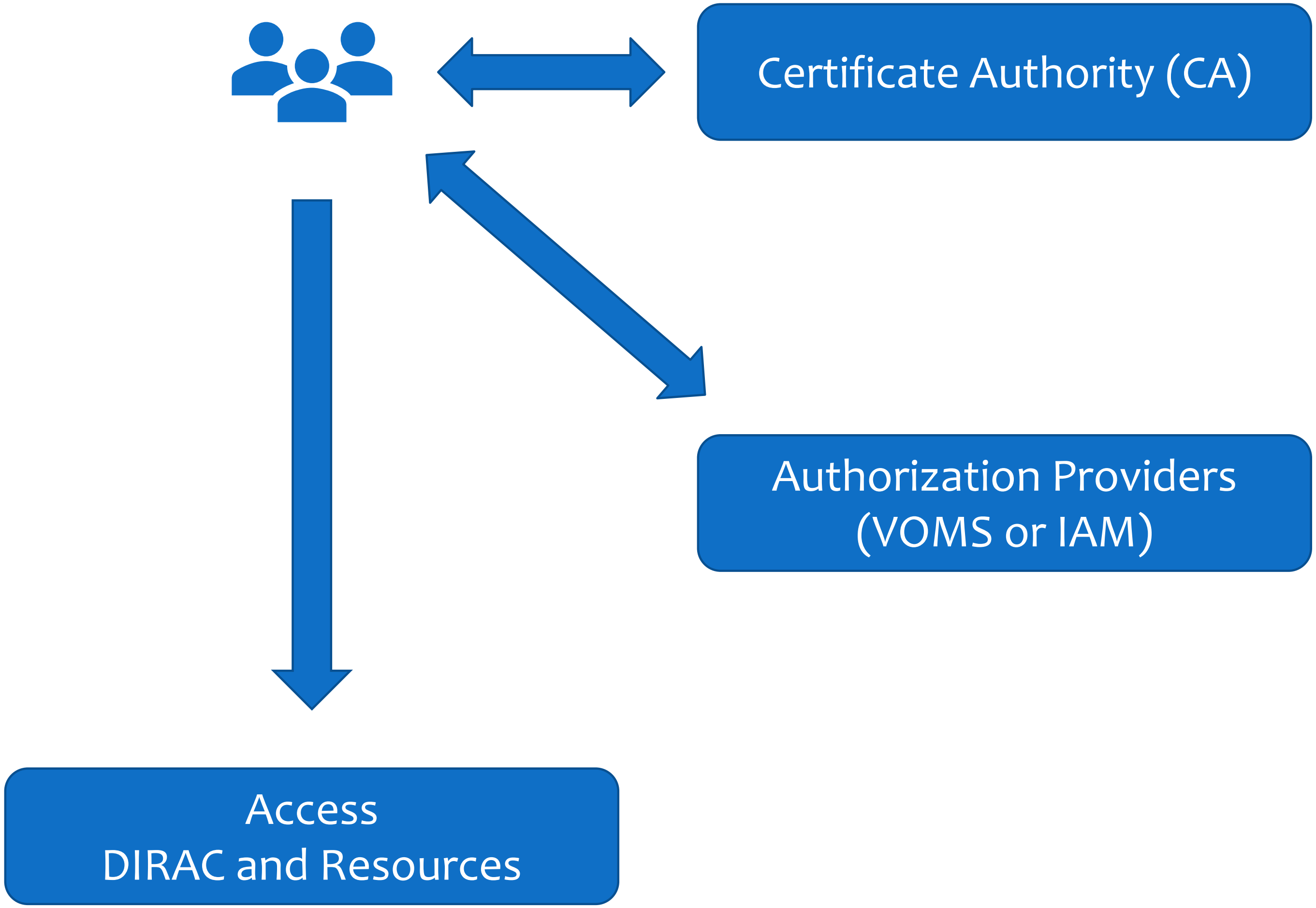
For Resource Sites,

- Sites need to recognized the authenticated users and provided authorized resources.

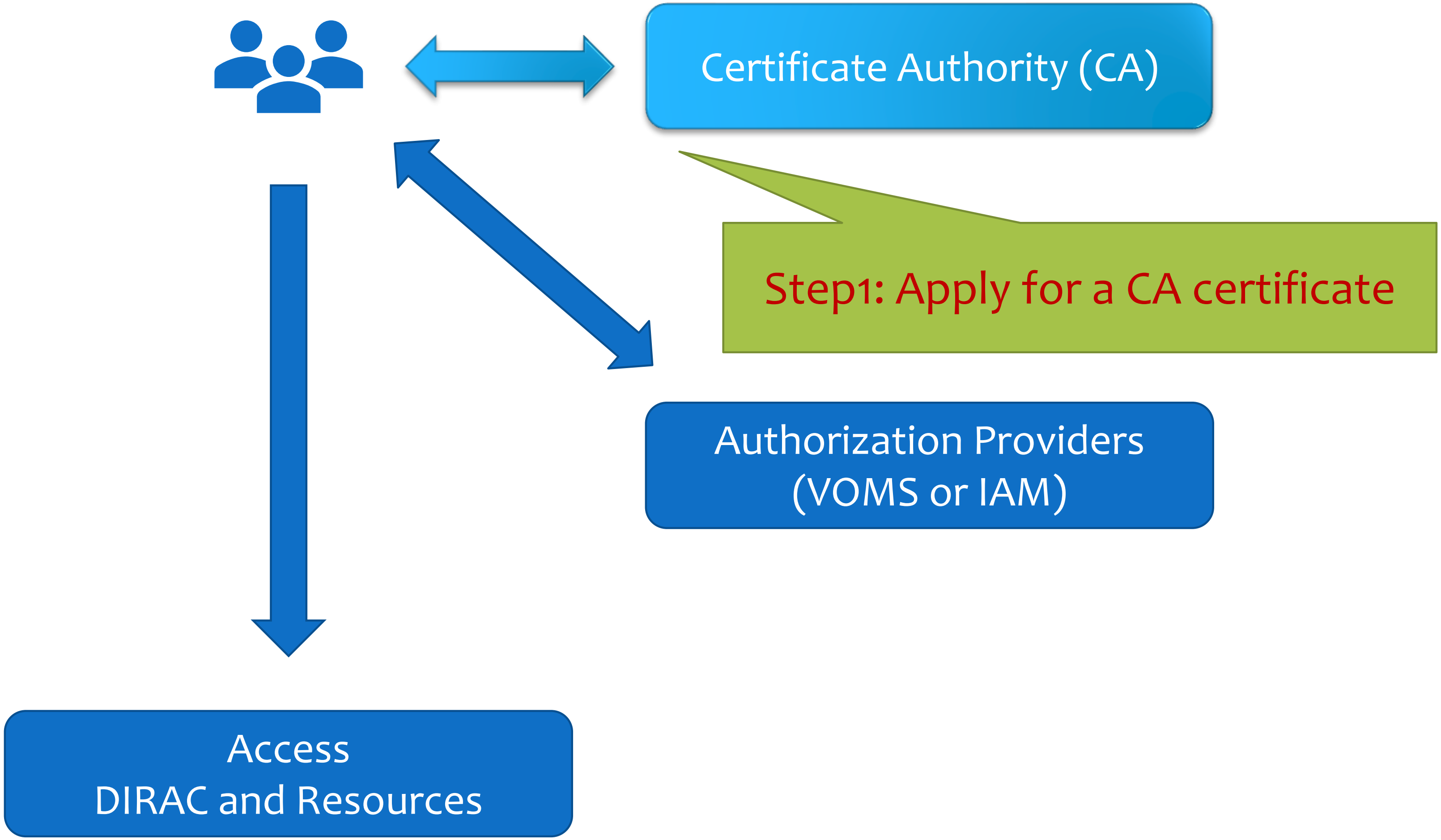
For DCI Service,

- An Authentication and Authorization Infrastructure (AAI) need to be build for users and resources sites.

AuthN/AuthZ Model



Step 1


Certificate Authority (CA)
Step1: Apply for a CA certificate
Authorization Providers
(VOMS or IAM)
Access
DIRAC and Resources

Digital Certificate

A digital certificate (X.509) is normally used as a personal identity for each user.

- **Trusted by the organizations in Grid,**
- **Can be applied from Certificate Authority (CA) in many countries.**
- **Usually need to provide your personal information and apply on a webpage.**

Grid recognized CA examples:

- **IHEP**
  - IHEP Grid Computing Certification Authority (Link)
- **INFN**
  - FAQ (Link)
  - Wiki INFN (Link)
- **CNRS**
  - Request (Link)
- **Germany**
  - CA at Karlsruhe Institute of Technology (Link)
- **Or find other CAs for you at igtf.net.**

CA Certificate

Take IHEP CA as an example, details in link,

1. **Contact the CA web page and access the request form,**
2. **Follow instructions to fill application and submit,**
3. **Receive your personal certificate in p12 file format by the link in email.**
4. **Export the personal certificate to your browser.**

About your personal certificate,

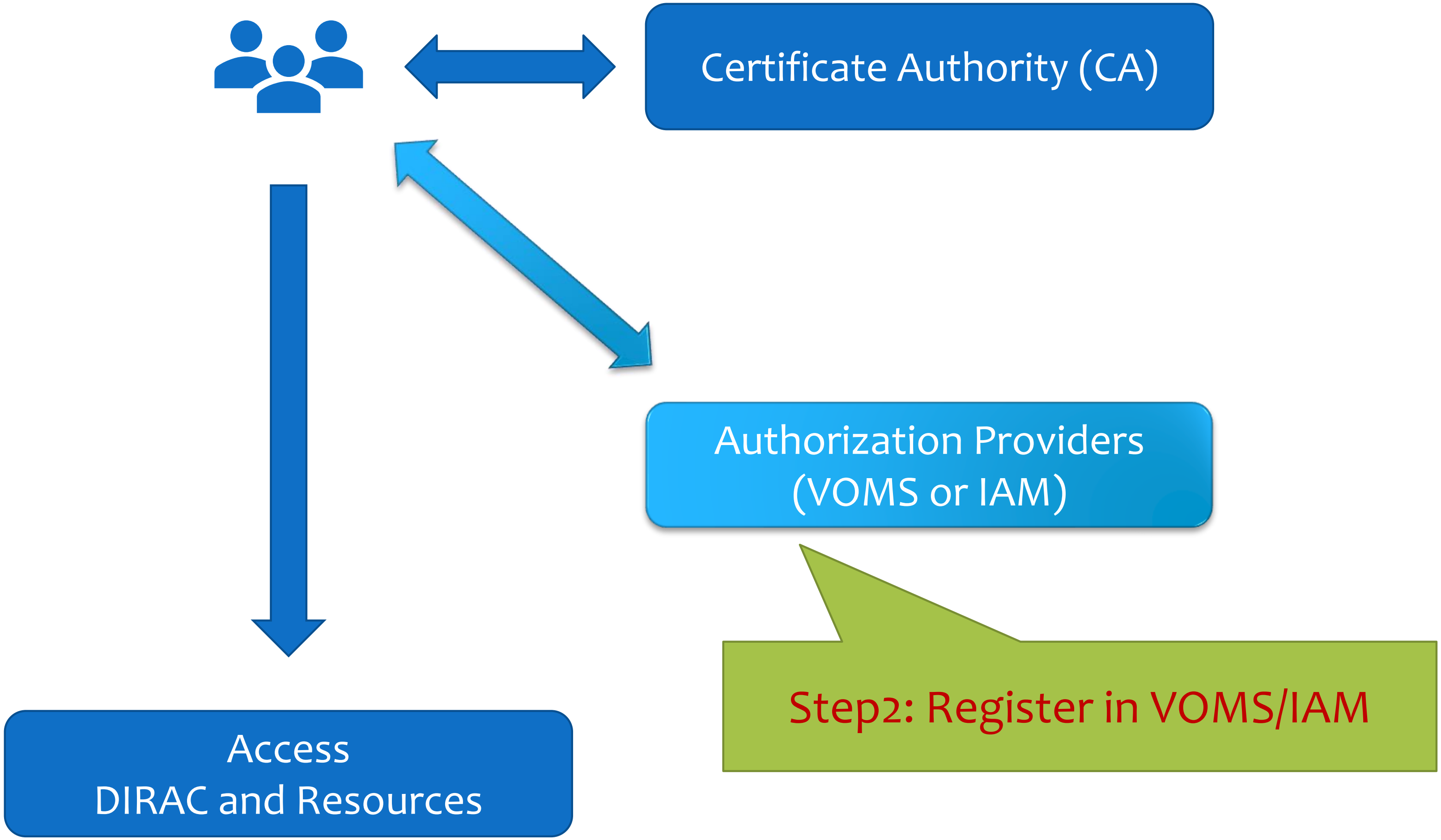
- **A p12 file composes 2 part,**
  - Public key, so called `cert`,
  - Private key, so called `key`.
- **You need to convert a certificate from p12 to pem file format.**
  - This will split your certificate by cert and key part.

CA Certificate Exercise

Try it:

1. Upload your p12 file to cluster.
2. At cluster, create .globus directory
```
mkdir ~/.globus
```
3. Extract public key from p12
```
openssl pkcs12 -in <certificates>.p12
               -clcerts -nokeys
               -out ~/.globus/usercert.pem
```
4. Extract private key from p12
```
openssl pkcs12 -in <certificates>.p12
               -nocerts
               -out ~/.globus/userkey.pem
```
5. Change the access rights for your keys
```
chmod 644 ~/.globus/usercert.pem
chmod 400 ~/.globus/userkey.pem
```
6. Browse your personal certificate information
```
openssl x509 -in usercert.pem -noout -text
```

Step 2


Certificate Authority (CA)
Authorization Providers
(VOMS or IAM)
Step2: Register in VOMS/IAM
Access
DIRAC and Resources

Authorization Providers: VOMS

Virtual Organization (VO),

- A VO is a physical resource provider.
- **JUNO VO** provides DCI resources.

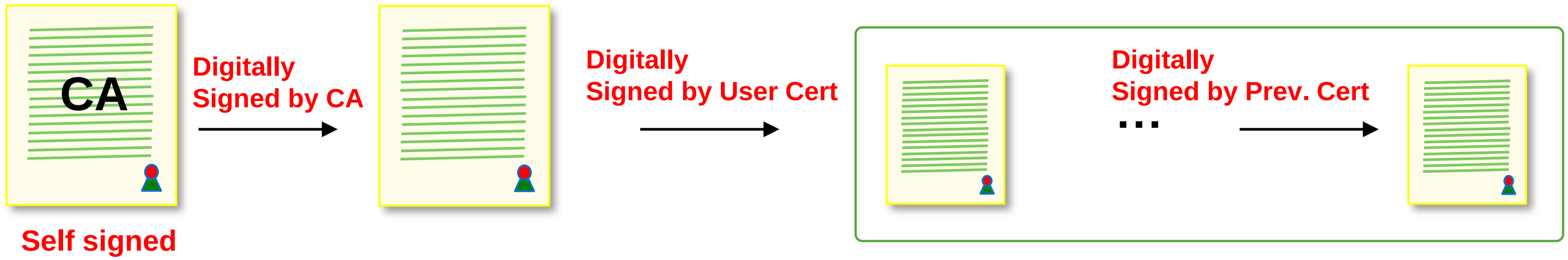
Virtual Organization Membership Services (VOMS),

- Create user groups for VO.
- Create different roles among existing groups.
- Generate VOMS proxy for users to access VO resources.
- Before the end of 2023, another system, **Identity and Access Management (IAM),** will replace VOMS as future VO authorization provider.

VOMS Proxy

About VOMS proxy,

- Personal certificate is not directly exposed,
- Most of Grids use temporary certificates (proxies),
- Normal lifetime 12h,
- Proxies are certificates digitally signed by the original certificate or another proxy (delegation),
- Stored proxies may be used to renew other proxies.



VOMS Usage

For a JUNO DCI user,

- **At first time you use DCI, Register yourself in VOMS with your personal certificate at https://voms.ihep.ac.cn:8443.**
  1. Select JUNO VO,
  2. Follow instructions to fill application,
  3. Read and allow AUP,
  4. Receive the confirmation email and confirm,
  5. Receive the message email about your accepted application.
- **At each time you use DCI services and resources in cluster, generate VOMS proxy each time.**

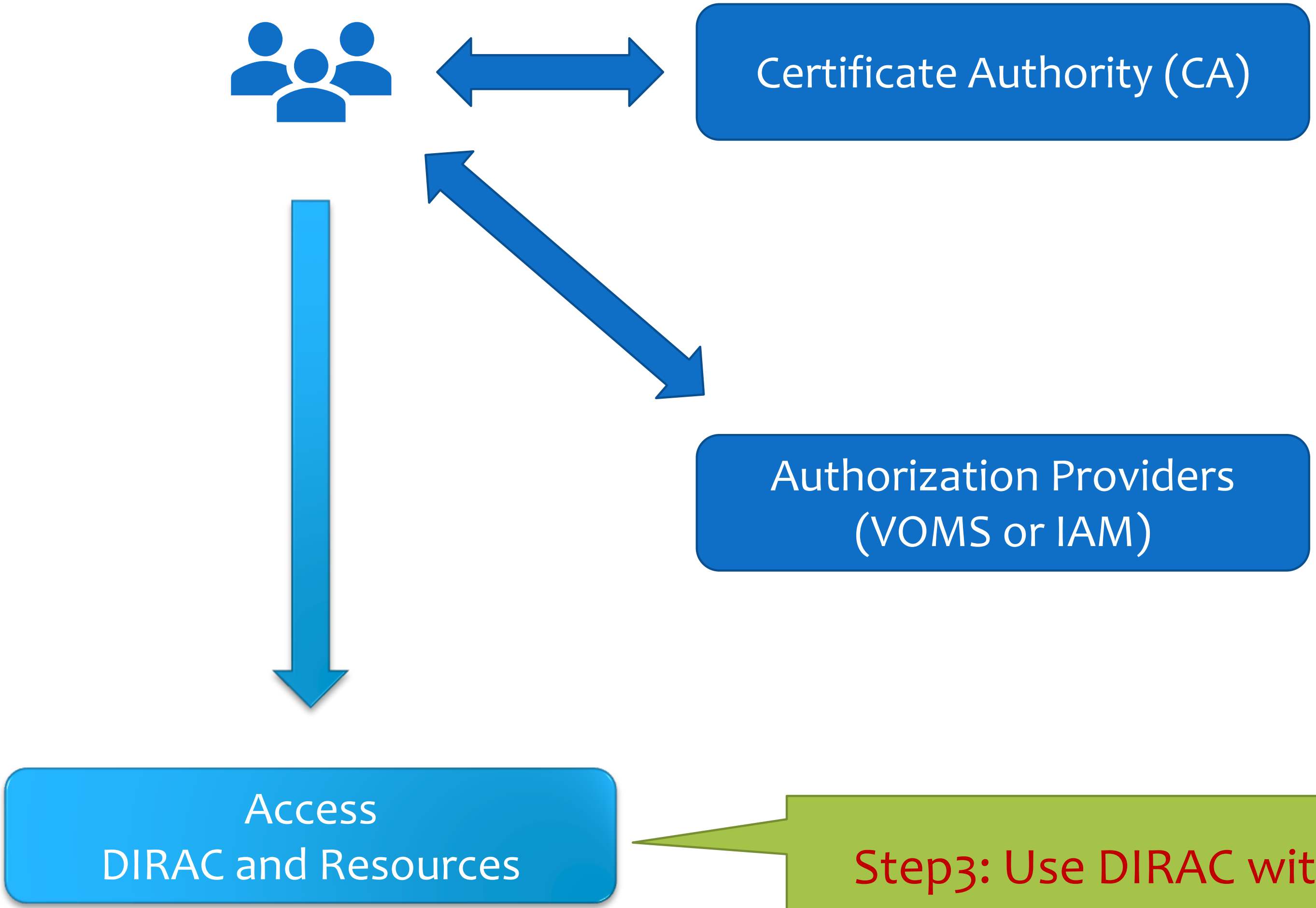
VOMS Exercise

Try it:

1. **Look at your VOMS personal information at [VOMS user home].**
2. **At cluster, generate VOMS proxy**
   `voms-proxy-init --voms juno`
3. **Get your proxy info by**
   `voms-proxy-info --all`
4. **Check your proxy credential by**
   `openssl x509 -in /tmp/x509up_u$(id -u) -noout -text`
5. **For IHEP EOS user,**
   - The EOS identification priority is Grid cert > local user, so when you set the globus environment, `eos` command will inform you to type in your Grid password.

     ```
     230207 18:16:02 25149 cryptossl_X509CreateProxy: Your identity:
     /C=CN/O=HEP/O=IHEP/OU=CC/CN=Xuantong Zhang
     Enter PEM pass phrase:
     ```
   - If you do not want to use grid user identity just tape Enter without input password.
   - Or you can rename your Grid certs by `mv ~/.globus/ ~/.globus.juno/` to always use local user identity.

Step 3



Step3: Use DIRAC with VOMS

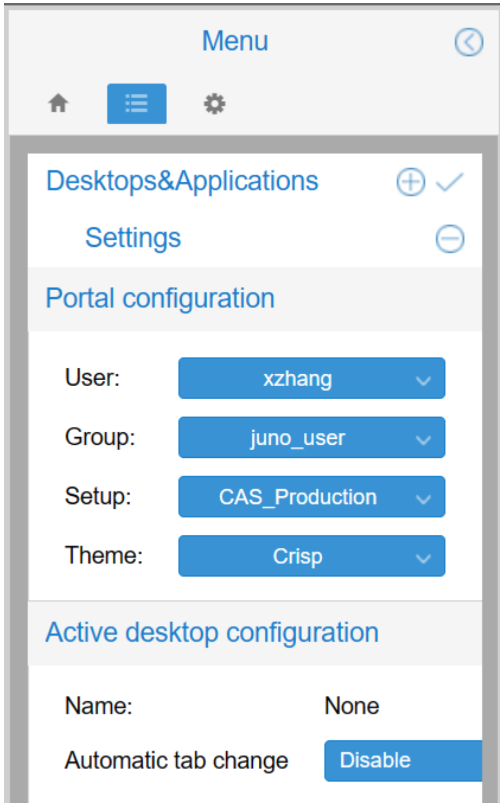
DIRAC Proxy

DIRAC also uses VOMS proxy to identify users,

- Both for login DIRAC and use DIRAC working on resources.
- DIRAC will synchronize your user information from VOMS to DIRAC registry system.

Access DIRAC,

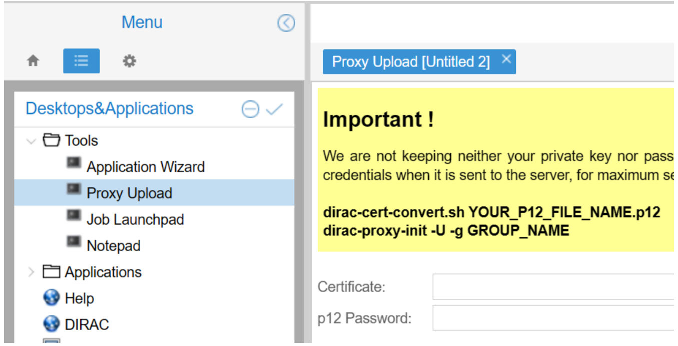
- On webpage, use your personal certificate in browser.
- At cluster, generate DIRAC proxy, which is almost same method as VOMS proxy.



DIRAC Proxy Exercise

Try it:

1. Access [DIRAC webpage](#) with your personal certificate.
2. Upload your own proxy to DIRAC.



3. At cluster, generate your DIRAC proxy
```
source /cvmfs/dcomputing.ihep.ac.cn/
dirac-proxy-init -g juno_user
```
4. Check your DIRAC proxy
```
dirac-proxy-info
```

Thank you!