AFS & Kerberos Install Instructions:

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# Recent versions of Windows:

(should work on XP+ apparently)

Download and install OpenAFS 1.7.31: <https://dl.openafs.org/dl/openafs/1.7.31/winxp/openafs-en_US-64bit-1-7-3100.msi>

And

<https://dl.openafs.org/dl/openafs/1.7.31/winxp/openafs-32bit-tools-en_US-1-7-3100.msi>

(openafs.org has 32bit only versions if you need or for windows 2000….yes, afs and kerberos have not really changed since the late 90s and software from then still connects)

When asked for cell it should be ANDREW.CMU.EDU (yes, in caps)

On Windows 11 and maybe 10, you need to disable core isolation, specifically Microsoft Vulnerable Driver Blocklist and Local Security Authority protection to let the old driver run. This is in Windows Security (from start menu).

Download and install Kerberos 4.1: <https://web.mit.edu/kerberos/dist/kfw/4.1/kfw-4.1-amd64.msi>

Edit C:\ProgramData\MIT\Kerberos5\krb5.ini as Administrator

You can do this by running cmd.exe as administrator (from start menu), then run notepad.exe <file name here>

Place this content into the document:

[libdefaults]

dns\_lookup\_realm = false

dns\_lookup\_kdc = true

ticket\_lifetime = 24h

renew\_lifetime = 7d

forwardable = true

rdns = false

default\_realm = ANDREW.CMU.EDU

allow\_weak\_crypto = true

no-addresses = true

proxiable = true

krb4\_get\_tickets = false

[realms]

ECE.CMU.EDU = {

default\_domain = ece.cmu.edu

admin\_server = krbadmin.ece.cmu.edu

kdc = kerberos.ece.cmu.edu

kdc = kerberos-1.ece.cmu.edu

kdc = kerberos-2.ece.cmu.edu

kdc = kerberos-3.ece.cmu.edu

}

GO.ECE.CMU.EDU = {

admin\_server = gossamer.go.ece.cmu.edu

kdc = gossamer.go.ece.cmu.edu

kdc = pgh-ad-ece-001.go.ece.cmu.edu

}

ANDREW.CMU.EDU = {

admin\_server = kerberos.andrew.cmu.edu

kdc = kerberos.andrew.cmu.edu

kdc = kerberos2.andrew.cmu.edu

kdc = kerberos3.andrew.cmu.edu

}

[appdefaults]

pam = {

null\_afs=true

validate = true

ECE.CMU.EDU = {

afs\_cells = ece.cmu.edu andrew.cmu.edu

}

ANDREW.CMU.EDU = {

afs\_cells = andrew.cmu.edu ece.cmu.edu

}

}

Open Command Prompt (not admin)

Run the following (every 24hrs):

kinit [{ANDREW ID}@ANDREW.CMU.EDU](mailto:{ANDREW ID}@ANDREW.CMU.EDU)

aklog andrew.cmu.edu ece.cmu.edu

Now go to the following network location in Windows Explorer:

[\\AFS\ece.cmu.edu\user\{ANDREW](../../..//AFS/ece.cmu.edu/user/%7BANDREW) ID}

You should have read/edit access

Debian and derivatives:

Run the following

sudo apt install openafs-client openafs-modules-dkms openafs-krb5

sudo apt install krb5-user

When asked for cell AND realm both should be ANDREW.CMU.EDU (yes, in caps, though cell may prefer lowercase)

Now look towards generic linux instructions:

# RHEL8 and derivatives

This is a little more complicated since openAFS isn’t in the repos and openAFS stopped giving compiled packages for ~EL6

Download and activation for RHEL 8.10 (yes, specifically this version) (you get 16 free activations): <https://developers.redhat.com/articles/faqs-no-cost-red-hat-enterprise-linux>

First make sure you’re activated with a developer license (make a developer Red hat account):

subscription-manager register --username [your\_username] --password [your\_password]

Run the following:

sudo rpm --import https://download.sinenomine.net/openafs/rpms/RPM-GPG-KEY-sinenomine-pmanager

sudo yum install https://download.sinenomine.net/openafs/rpms/sna-openafs-release-latest.noarch.rpm

sudo yum update kernel

Reboot here if kernel update was needed

sudo dnf install -y kernel-devel-$(uname -r)

sudo yum install krb5-workstation openafs-krb5

sudo yum install openafs-client kmod-openafs

You might need to do this instead of the last line if your kernel version is not exactly 4.18.0-553.74.1.el8\_10.x86\_64 (run uname -a):

sudo dnf install https://dl.fedoraproject.org/pub/epel/epel-release-latest-8.noarch.rpm

sudo dnf install epel-release

sudo yum install krb5-workstation openafs-krb5 dkms-openafs

Edit /usr/src/openafs-1.8.13.2-1.el8/dkms.conf and remove #NO\_WEAK\_MODULES="true"

sudo dkms install openafs/1.8.13.2-1.el8

# Generic Linux instructions:

Edit the following files at */usr/vice/etc/* (i.e. cd */usr/vice/etc/), or /etc/openafs/ on Debian-based systems (i.e. cd /etc/openafs)*

*CellAlias should have:*

ece.cmu.edu ece

andrew.cmu.edu andrew

cs.cmu.edu cs

ThisCell should be:

andrew.cmu.edu

Now copy this into /etc/krb5.conf, or merge the contents:

[libdefaults]

dns\_lookup\_realm = false

dns\_lookup\_kdc = true

ticket\_lifetime = 24h

renew\_lifetime = 7d

forwardable = true

rdns = false

default\_realm = ANDREW.CMU.EDU

default\_ccache\_name = KEYRING:persistent:%{uid}

allow\_weak\_crypto = true

no-addresses = true

proxiable = true

krb4\_get\_tickets = false

[realms]

ECE.CMU.EDU = {

default\_domain = ece.cmu.edu

admin\_server = krbadmin.ece.cmu.edu

kdc = kerberos.ece.cmu.edu

kdc = kerberos-1.ece.cmu.edu

kdc = kerberos-2.ece.cmu.edu

kdc = kerberos-3.ece.cmu.edu

}

GO.ECE.CMU.EDU = {

admin\_server = gossamer.go.ece.cmu.edu

kdc = gossamer.go.ece.cmu.edu

kdc = pgh-ad-ece-001.go.ece.cmu.edu

}

ANDREW.CMU.EDU = {

admin\_server = kerberos.andrew.cmu.edu

kdc = kerberos.andrew.cmu.edu

kdc = kerberos2.andrew.cmu.edu

kdc = kerberos3.andrew.cmu.edu

}

[logging]

default = FILE:/var/log/krb5libs.log

kdc = FILE:/var/log/krb5kdc.log

admin\_server = FILE:/var/log/kadmind.log

[appdefaults]

pam = {

ccache\_dir = /var/tmp

ccname\_template = KEYRING:persistent:%U

null\_afs=true

validate = true

ECE.CMU.EDU = {

afs\_cells = ece.cmu.edu andrew.cmu.edu

}

ANDREW.CMU.EDU = {

afs\_cells = andrew.cmu.edu ece.cmu.edu

}

}

Now run (every 24hrs):

kinit [{ANDREW ID}@ANDREW.CMU.EDU](mailto:{ANDREW ID}@ANDREW.CMU.EDU)

aklog andrew.cmu.edu ece.cmu.edu

You should have your stuff in [/afs/ece.cmu.edu/user/{ANDREW](../../..//AFS/ece.cmu.edu/user/%7BANDREW) ID}

The Andrew stuff should be in /afs/andrew.cmu.edu/usr1/{ANDREW ID}… you may need to replace usr1 with your location (pwd on a Andrew server)

I recommend using ln -s to make a symlink to your afs directory in ~/

# Passwordless SSH:

You can authenticate SSH with Kerberos instead to CMU or MIT servers, by running ssh -K <server here> -l username

It is however impossible to disable 2fa on athena.dialup.mit.edu servers. MIT EECS servers don’t have 2fa but you need extra permissions for those. eceXXX.ece.local.cmu.edu servers do not have 2fa. [unix.andrew.cmu.edu](mailto:andrewid@unix.andrew.cmu.edu:/etc/krb5.conf) is also valid.

# Installing Virtuoso from ECE license:

This only works on RHEL8 and possibly its derivatives.

At the minimum you need:

sudo dnf install openssl findutils compat-openssl10 freetype mesa-libGLU libXrender libXScrnSaver compat-openssl10 mesa-libGLU libXrender libXScrnSaver libXft libXi apr-util wget tcsh ksh

sudo ln -s /afs/ece.cmu.edu/support/cds/share/image/usr/cds /usr/local/cds

sudo ln -s /usr/local/cds /usr/cds

You should be able to go to your afs directory, cd to gpdkXXXX (i.e. your install directory), and run the normal script to load virtuoso now. If you still have package dependencies, you can google the error and do dnf/yum install and/or make sure you have all of these packages:

glibc  
glibc-devel.i686  
glibc-devel.x86\_64  
glibc.i686  
glibc.x86\_64  
libgcc.i686  
libgcc.x86\_64  
libsss\_nss\_idmap.i686  
libsss\_nss\_idmap.x86\_64  
libstdc++.i686  
libstdc++.x86\_64  
compat-libgfortran-48.i686  
compat-libgfortran-48.x86\_64  
ncurses-compat-libs.x86\_64  
lz4-libs.i686  
lz4-libs.x86\_64  
pkgconf.i686  
pkgconf.x86\_64  
ncurses-c++-libs.i686  
ncurses-c++-libs.x86\_64  
gdbm-libs.i686  
gdbm-libs.x86\_64  
libnsl.i686  
libnsl.x86\_64  
libpng15.i686  
libpng15.x86\_64  
SDL-devel  
bitmap-fixed-fonts  
compat-libtiff3.x86\_64  
compat-libtiff3.i686  
compat-openssl10.x86\_64  
compat-openssl10.i686  
fuse-devel  
libvirt-devel  
swig  
mariadb  
gdbm.i686  
gdbm.x86\_64  
ncurses-compat-libs.i686  
hpijs  
hplip  
libhugetlbfs-devel  
libpng12.i686  
unixODBC-devel  
compat-libpthread-nonshared  
compat-libpthread-nonshared.x86\_64  
libmng-devel.i686  
libmng-devel.x86\_64  
  
  
RHEL8:  
libICE-devel  
libICE-devel.i686  
libICE-devel.x86\_64  
libSM-devel  
libX11-devel  
libX11-devel.i686  
libX11-devel.x86\_64  
libXScrnSaver-devel.i686  
libXScrnSaver-devel.x86\_64  
libXau-devel  
libXaw-devel  
libXext-devel  
libXext-devel.i686  
libXext-devel.x86\_64  
libXext.i686  
libXext.x86\_64  
libXft-devel  
libXft-devel.i686  
libXft-devel.x86\_64  
libXi-devel  
libXinerama-devel  
libXmu-devel  
libXmu-devel.i686  
libXmu-devel.x86\_64  
libXp.i686  
libXp.x86\_64  
libXpm-devel  
libXpm.i686  
libXpm.x86\_64  
libXrandr-devel  
libXrender-devel  
libXrender-devel.i686  
libXrender-devel.x86\_64  
libXrender.i686  
libXrender.x86\_64  
libXt-devel  
libXt.i686  
libXt.x86\_64  
libXtst-devel  
libXtst.i686  
libXtst.x86\_64  
libpng-devel.i686  
libpng-devel.x86\_64  
mesa-dri-drivers.i686  
mesa-dri-drivers.x86\_64  
mesa-libGL-devel  
mesa-libGLU-devel  
mesa-libGLU.i686  
mesa-libGLU.x86\_64  
mesa-libGLw-devel  
motif-devel  
motif.i686  
motif.x86\_64  
python3.11-devel  
python3.11-setuptools  
gnutls-devel.i686  
gnutls-devel.x86\_64  
apr  
apr-devel  
apr-util

# Changes for MIT Athena:

ThisCell should be athena.mit.edu. Realm should be ATHENA.MIT.EDU on setup. CSAIL has its own AFS servers which are CSAIL.MIT.EDU, but you need access to a CSAIL account.

kinit [{kerb}@ATHENA.MIT.EDU](mailto:{kerb}@ATHENA.MIT.EDU)

aklog athena.mit.edu

Your home dir should be in a location like /afs/athena.mit.edu/user/ or on Windows [\\AFS\athena.mit.edu\user\{ANDREW](../../..//AFS/athena.mit.edu/user/%7BANDREW) ID}

/etc/krb5.conf should contain:

# Other applications require this directory to perform krb5 configuration.

includedir /etc/krb5.conf.d/

[libdefaults]

ccache\_type = 4

default\_keytab\_name = /etc/krb5.keytab

default\_realm = ATHENA.MIT.EDU

forwardable = true

kdc\_timesync = 1

noaddresses = true

proxiable = true

[realms]

ATHENA.MIT.EDU = {

kdc = kerberos.mit.edu:88

kdc = kerberos-1.mit.edu:88

kdc = kerberos-2.mit.edu:88

kdc = kerberos-3.mit.edu:88

admin\_server = kerberos.mit.edu

master\_kdc = kerberos.mit.edu

default\_domain = mit.edu

}

1TS.ORG = {

kdc = kerberos.1ts.org

admin\_server = kerberos.1ts.org

}

ANDREW.CMU.EDU = {

kdc = kerberos.andrew.cmu.edu

kdc = kdc-04.andrew.cmu.edu

kdc = kdc-05.andrew.cmu.edu

kdc = kdc-06.andrew.cmu.edu

admin\_server = kerberos.andrew.cmu.edu

default\_domain = andrew.cmu.edu

}

CONVIVIAN.COM = {

kdc = kerberos.convivian.com

admin\_server = kerberos.convivian.com

}

CLUB.CC.CMU.EDU = {

kdc = kerberos.club.cc.cmu.edu

kdc = kerberos-1.club.cc.cmu.edu

admin\_server = kerberos-admin.club.cc.cmu.edu

default\_domain = club.cc.cmu.edu

v4\_domain = club.cc.cmu.edu

}

CS.CMU.EDU = {

kdc = kerberos-1.srv.cs.cmu.edu

kdc = kerberos-2.srv.cs.cmu.edu

kdc = kerberos-3.srv.cs.cmu.edu

admin\_server = kerberos.cs.cmu.edu

}

CSAIL.MIT.EDU = {

kdc = kerberos-1.csail.mit.edu

kdc = kerberos-2.csail.mit.edu

admin\_server = kerberos.csail.mit.edu

default\_domain = csail.mit.edu

krb524\_server = krb524.csail.mit.edu

}

CYGNUS.COM = {

kdc = KERBEROS.CYGNUS.COM

kdc = KERBEROS-1.CYGNUS.COM

admin\_server = KERBEROS.CYGNUS.COM

}

DEMENTIA.ORG = {

kdc = kerberos.dementix.org

kdc = kerberos2.dementix.org

admin\_server = kerberos.dementix.org

}

DOOMCOM.ORG = {

kdc = kerberos.doomcom.org

admin\_server = kerberos.doomcom.org

}

GNU.ORG = {

kdc = kerberos.gnu.org

kdc = kerberos-2.gnu.org

kdc = kerberos-3.gnu.org

admin\_server = kerberos.gnu.org

}

GRAND.CENTRAL.ORG = {

kdc = kerberos2.central.org

admin\_server = kerberos2.central.org

}

GRATUITOUS.ORG = {

kdc = kerberos.gratuitous.org

admin\_server = kerberos.gratuitous.org

}

GREY17.ORG = {

kdc = kerberos.grey17.org

admin\_server = kerberos.grey17.org

}

IHTFP.ORG = {

kdc = kerberos.ihtfp.org

admin\_server = kerberos.ihtfp.org

}

MOOF.MIT.EDU = {

kdc = three-headed-dogcow.mit.edu:88

kdc = three-headed-dogcow-1.mit.edu:88

admin\_server = three-headed-dogcow.mit.edu

}

PSC.EDU = {

kdc = kerberos-1.psc.edu

kdc = kerberos-2.psc.edu

kdc = kerberos-3.psc.edu

admin\_server = kerberos-1.psc.edu

}

stanford.edu = {

kdc = krb5auth1.stanford.edu

kdc = krb5auth2.stanford.edu

kdc = krb5auth3.stanford.edu

master\_kdc = krb5auth1.stanford.edu

admin\_server = krb5-admin.stanford.edu

default\_domain = stanford.edu

}

TONGUECRAFT.COM = {

kdc = kerberos.tonguecraft.com

admin\_server = kerberos.tonguecraft.com

}

UTORONTO.CA = {

kdc = kerberos1.utoronto.ca

kdc = kerberos2.utoronto.ca

kdc = kerberos3.utoronto.ca

admin\_server = kerberos1.utoronto.ca

default\_domain = utoronto.ca

}

ZEPA.NET = {

kdc = kerberos.zepa.net

kdc = kerberos-too.zepa.net

admin\_server = kerberos.zepa.net

}

ZONE.MIT.EDU = {

kdc = casio.mit.edu

kdc = seiko.mit.edu

admin\_server = casio.mit.edu

}

[domain\_realm]

.mit.edu = ATHENA.MIT.EDU

mit.edu = ATHENA.MIT.EDU

.whoi.edu = ATHENA.MIT.EDU

whoi.edu = ATHENA.MIT.EDU

.andrew.cmu.edu = ANDREW.CMU.EDU

.acs.cmu.edu = ANDREW.CMU.EDU

.cc.cmu.edu = ANDREW.CMU.EDU

.res.cmu.edu = ANDREW.CMU.EDU

.epp.cmu.edu = ANDREW.CMU.EDU

.as.cmu.edu = ANDREW.CMU.EDU

.hss.cmu.edu = ANDREW.CMU.EDU

.lcl.cmu.edu = ANDREW.CMU.EDU

.phil.cmu.edu = ANDREW.CMU.EDU

.phys.cmu.edu = ANDREW.CMU.EDU

.cfa.cmu.edu = ANDREW.CMU.EDU

.math.cmu.edu = ANDREW.CMU.EDU

.net.cmu.edu = ANDREW.CMU.EDU

.psy.cmu.edu = ANDREW.CMU.EDU

.arc.cmu.edu = ANDREW.CMU.EDU

.ce.cmu.edu = ANDREW.CMU.EDU

.library.cmu.edu = ANDREW.CMU.EDU

.cees.cmu.edu = ANDREW.CMU.EDU

.cheme.cmu.edu = ANDREW.CMU.EDU

.gsia.cmu.edu = ANDREW.CMU.EDU

.heinz.cmu.edu = ANDREW.CMU.EDU

.ini.cmu.edu = ANDREW.CMU.EDU

.me.cmu.edu = ANDREW.CMU.EDU

.csw.cmu.edu = ANDREW.CMU.EDU

.cs.cmu.edu = CS.CMU.EDU

.ri.cmu.edu = CS.CMU.EDU

.edrc.cmu.edu = CS.CMU.EDU

.ices.cmu.edu = CS.CMU.EDU

cs.cmu.edu = CS.CMU.EDU

ri.cmu.edu = CS.CMU.EDU

edrc.cmu.edu = CS.CMU.EDU

ices.cmu.edu = CS.CMU.EDU

.csail.mit.edu = CSAIL.MIT.EDU

csail.mit.edu = CSAIL.MIT.EDU

dementia.org = DEMENTIA.ORG

.dementia.org = DEMENTIA.ORG

.exchange.mit.edu = EXCHANGE.MIT.EDU

exchange.mit.edu = EXCHANGE.MIT.EDU

central.org = GRAND.CENTRAL.ORG

.central.org = GRAND.CENTRAL.ORG

.media.mit.edu = MEDIA.MIT.EDU

media.mit.edu = MEDIA.MIT.EDU

psc.edu = PSC.EDU

.psc.edu = PSC.EDU

.stanford.edu = stanford.edu

.slac.stanford.edu = SLAC.STANFORD.EDU

.toronto.edu = UTORONTO.CA

.utoronto.ca = UTORONTO.CA

tonguecraft.com = TONGUECRAFT.COM

.tonguecraft.com = TONGUECRAFT.COM

.win.mit.edu = WIN.MIT.EDU

win.mit.edu = WIN.MIT.EDU

zepa.net = ZEPA.NET

.zepa.net = ZEPA.NET

# Mac:

Unknown. Compile from scratch? <http://openafs.org/release/latest.html>and https://web.mit.edu/kerberos/

This might work on intel macs: [http://openafs.org/macos.htm](http://openafs.org/macos.html)