

# **Building Enduro/X On GNU/Linux Platform**

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## Chapter 1

# About manual

This manual describes how to build *Enduro/X* on fresh installed Ubuntu 14.04 and Centos 6.x. Process includes description of kernel configuration, required package installation and finally finishing all with unit test completion.

This installation manual assumes that OS user for installation is *user1*, located at */home/user1*. The Enduro/X system will build at path */home/user1/endurox*.

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## Chapter 2

# Configuring Linux Kernel parameters

Kernel parameter configuration is needed for Enduro/X runtime. But as we plan here to build the system and run unit-tests, then we need a configuration for runtime.

## 2.1 Security Configuration

```
$ sudo -s
# cat << EOF >> /etc/security/limits.conf

# Do not limit message Q Count.
# Some Linux 3.x series kernels have a bug, that limits 1024
# queues for one system user.
# In 2.6.x and 4.x this is fixed, to have
# unlimited count of queues (memory limit).
# ealrier and later Linuxes have fixed this issue.
*                soft    msgqueue    -1
*                hard    msgqueue    -1

# Increase the number of open files
*                soft    nofile    1024
*                hard    nofile    65536

EOF
# exit
$
```

## 2.2 Message Queue Configuration

At the startup of the system needs to mount a Posix Queues folder, and needs to set a appropriate limits. To do this automatically at system startup, Linuxes which supports */etc/rc.local*, must add following lines before "exit 0". For Ubuntu 18.x+ create file from scratch (also add "exit 0" there at the end):

```
#!/bin/bash

# Mount the /dev/mqueue
# Not for Debian 8.x: queue is readly mounted, thus test:

if [ ! -d /dev/mqueue ]; then
    mkdir /dev/mqueue
    mount -t mqueue none /dev/mqueue
```

```
fi

# Max Messages in Queue
echo 10000 > /proc/sys/fs/mqueue/msg_max

# Max message size, to pass unit tests, use 1M+1K
echo 1049600 > /proc/sys/fs/mqueue/msgsize_max

# Max number of queues for user
echo 10000 > /proc/sys/fs/mqueue/queues_max
```

Note for Centos/RHEL/Oracle Linux 7+/Ubuntu 18 you need to give execute permissions for rc.local:

```
# chmod +x /etc/rc.local
```

Load the configuration by doing:

```
# /etc/rc.local
```

For Ubuntu 18 you may do following:

```
$ sudo systemctl start rc-local
$ sudo systemctl status rc-local
$ sudo systemctl enable rc-local
```

## Chapter 3

# Getting the source & building

### 3.1 OS dependency installation

#### 3.1.1 System level dependencies - for Gentoo Linux

```
$ su - root
# emerge sync
# emerge -av indent asciidoc dlatex libxml2 cmake dia \
    flex bison zlib openssl app-crypt/gpgme dev-vcs/git
```

#### 3.1.2 System level dependencies - for Debian 8.2

The same goes on Raspbian (Raspberry Pi OS)

```
$ sudo apt-get update
$ sudo apt-get install indent asciidoc dlatex libxml2-dev \
    cmake dia flex bison gcc g++ zlib1g-dev \
    libssl-dev libcrypto++9 libcrypto++-dev \
    libgpgme11-dev libxml2-dev git
```

#### 3.1.3 System level dependencies - for Ubuntu 14.04

```
$ sudo apt-get update
$ sudo apt-get install indent asciidoc dlatex libxml2-dev \
    cmake dia flex bison gcc g++ zlib1g-dev \
    libssl-dev libcrypto++9 libcrypto++-dev \
    libgpgme11-dev libxml2-dev git
```

#### 3.1.4 System level dependencies - for Ubuntu 16.04 (Mint 18), 18.04

```
$ sudo apt-get update
$ sudo apt-get install indent asciidoc dlatex libxml2-dev \
    cmake dia flex bison gcc g++ zlib1g-dev \
    libssl-dev libcrypto++-dev \
    libgpgme11-dev libxml2-dev libxml2-utils git
```

### 3.1.5 System level dependencies - for Centos 6.x

As some packages like 'dia' does not exists in base Centos install, then few of them we will borrow from Fedora project via epel-release. Which should be installed in following way: Download the latest epel-release rpm from (e.g. epel-release-6-8.noarch.rpm or later) [http://dl.fedoraproject.org/pub/epel/6/x86\\_64/epel-release-6-8.noarch.rpm](http://dl.fedoraproject.org/pub/epel/6/x86_64/epel-release-6-8.noarch.rpm) Install epel-release rpm:

```
$ su - root
# wget http://dl.fedoraproject.org/pub/epel/6/x86_64/epel-release-6-8.noarch.rpm
# rpm -Uvh epel-release*rpm
```

Now install system dependencies

```
# yum update
# yum groupinstall 'Development Tools'
# yum install git cmake asciidoc \
    openssl openssl-devel \
    gpgme-devel dia libxml2-devel
# exit
$
```

### 3.1.6 System level dependencies - for Centos/RHEL/Oracle Linux 7.x

Now install system dependencies

But if you run build on **Oracle Linux**, you need to enable optional repo for asciidoc/gpgme-devel/dblatex

```
# yum install yum-utils
# yum-config-manager --enable ol7_optional_latest
```

```
# yum groupinstall 'Development Tools'
# yum install git cmake asciidoc openssl openssl-devel \
    gpgme-devel redhat-lsb dblatex libxml2-devel
```

Centos 7 does not ship with 'dia' package. Thus we will install Fedora Core package: dia-0.97.2-5.fc19.x86\_64.rpm. Also we need to install additional deps to run dia.

```
# yum install -y cairo-gobject-devel gtk2 gtk2-devel gdk-pixbuf2-devel \
    libglade2-devel libgnomeui.x86_64 wget libgnomeui
# wget http://ftp.scientificlinux.org/linux/fedora/releases/19/Fedora/x86_64/os/Packages/d/ ↵
    dia-0.97.2-5.fc19.x86_64.rpm
# rpm -i --nodeps dia-0.97.2-5.fc19.x86_64.rpm
```

Seems that RHEL/Centos/Oracle Linux 7 ship with old CMake package which generates defective RPMs. Thus it The installation might give you following errors

```
$ sudo rpm -i *.rpm
file /usr/share/man from install of endurox-3.5.1-1.x86_64 conflicts with file from ↵
package filesystem-3.2-21.el7.x86_64
file /usr/share/man/man3 from install of endurox-3.5.1-1.x86_64 conflicts with file ↵
from package filesystem-3.2-21.el7.x86_64
file /usr/share/man/man5 from install of endurox-3.5.1-1.x86_64 conflicts with file ↵
from package filesystem-3.2-21.el7.x86_64
file /usr/share/man/man8 from install of endurox-3.5.1-1.x86_64 conflicts with file ↵
from package filesystem-3.2-21.el7.x86_64

$ cmake --version
cmake version 2.8.12.2
```

Install new CMake from sources:



```
$ su - root
# yum remove cmake
# exit
$ cd
$ wget https://cmake.org/files/v3.7/cmake-3.7.2.tar.gz
$ tar -xzf cmake-3.7.2.tar.gz
$ cd cmake-3.7.2
$ ./configure
$ make
$ su - root
# make install
# cmake --version
cmake version 3.7.2
```

CMake suite maintained and supported by Kitware ([kitware.com/cmake](http://kitware.com/cmake)).

### 3.1.7 System level dependencies - for Suse Linux Enterprise Server 12.3

To install all required dependencies, you need following sets of DVDs (or other sources), or later

- SLE SERVER, DVD1 (e.g. SLE-12-SP3-Server-DVD-x86\_64-GM-DVD1.iso)
- SLE SERVER, DVD2 (e.g. SLE-12-SP3-Server-DVD-x86\_64-GM-DVD2.iso)
- SLE SDK, DVD1 (e.g. SLE-12-SP2-SDK-DVD-x86\_64-GM-DVD1.iso)
- SLE SDK, DVD2 (e.g. SLE-12-SP2-SDK-DVD-x86\_64-GM-DVD2.iso)

Add these in the "Configured Software Repositories dialog" in YaST tool. Also ensure that RPM database is updated of available packages. One way to do this is Open the "Software Management" in the YaST, it will re-scan the available software sources.

installation of packages:

```
# zypper install git-core cmake flex bison gcc libxml2 libgpgme11 gcc-c++ \
libxml2-devel libgpgme-devel asciidoc cmake dia rpm-build
```

### 3.1.8 AsciiDoc Integration with Dia

Also Enduro/X includes documentation in sources, thus additional config is needed so that Dia package can build illustrations needed for manuals.

```
$ sudo mkdir /etc/asciidoc/filters/dia
$ sudo -s
# cat << EOF > /etc/asciidoc/filters/dia/dia-filter.conf
#
# AsciiDoc Dia filter configuration file.
#
# Version: 0.1

[blockdef-listing]
dia-style=template="dia-block",subs=(),posattrs=("style","file","target","size"),filter=' ↵
dia -t png -e "{outdir={indir}}/{imagesdir={imagesdir}/{target}}" "{outdir}/{file}" { ↵
size?-s {size}} > /dev/null'

[dia-block]
template::[image-blockmacro]
EOF
```

## 3.2 Getting the Source code

```
# useradd -m user1
# su - user1
$ cd /home/user1
$ git clone https://github.com/endurox-dev/endurox endurox
```

## 3.3 Enduro/X basic Environment configuration for HOME directory

This code bellow creates *ndrx\_home* executable file which loads basic environment, so that you can use sample configuration provided by Enduro/X in *sampleconfig* directory. This also assumes that you are going to install to *\$HOME/endurox/dist* folder.

```
$ cat << EOF > $HOME/ndrx_home
#!/bin/bash

# Where app domain lives
export NDRX_APPHOME=$HOME/endurox
# Where NDRX runtime lives
export NDRX_HOME=$HOME/endurox/dist/bin
# Debug config too
export NDRX_DEBUG_CONF=$HOME/endurox/sampleconfig/debug.conf

# NDRX config too.
export NDRX_CONFIG=$HOME/endurox/sampleconfig/ndrxconfig.xml

# Access for binaries
export PATH=$PATH:$HOME/endurox/dist/bin

# LIBPATH for .so
export LD_LIBRARY_PATH=$LD_LIBRARY_PATH:$HOME/endurox/dist/lib:$HOME/endurox/dist/lib64

# UBF/FML field tables
export FLDTBLDIR=$HOME/endurox/ubftest/ubftab

# To complete unit tests:
export NDRX_MSGSIZEMAX=1049600

# Increase stack size
ulimit -s 30751

EOF

$ chmod +x $HOME/ndrx_home
```

---

### Note

If you develop in Gnome (e.g. Mate) session, then do 'export DESKTOP\_SESSION=gnome' before run IDE (e.g. NetBeans).

---

## 3.4 Building the code

```
$ cd /home/user1/endurox
# If you want to have install folder to /home/user1/endurox/dist
# if you want system level install then run just $ cmake -DCMAKE_INSTALL_PREFIX:PATH=/usr .
$ cmake -DCMAKE_INSTALL_PREFIX:PATH='pwd'/dist .
```

---

```
$ make  
$ make install
```

## Chapter 4

# Unit Testing

Enduro/X basically consists of two parts: . XATMI runtime; . UBF/FML buffer processing. Each of these two sub-systems have own units tests.

### 4.1 UBF/FML Unit testing

```
$ cd /home/user1/endurox/ubftest
$ ./ubfunit1 2>/dev/null
Running "main"...
Completed "main": 5751 passes, 0 failures, 0 exceptions.
```

### 4.2 XATMI Unit testing

ATMI testing might take some time. Also ensure that you have few Gigabytes of free disk space, as logging requires some space. To run the ATMI tests do following:

```
$ cd /home/user1/endurox/atmitest
$ nohup ./run.sh &
$ tail -f /home/user1/endurox/atmitest/test.out
...
Setting domain 2
Server executable = tpbridge      Id = 101 :      Shutdown succeeded.
Server executable = convsv21     Id = 50 :      Shutdown succeeded.
Server executable = atmi.sv21    Id = 30 :      Shutdown succeeded.
Server executable = tmsrv        Id = 10 :      Shutdown succeeded.
Shutdown finished. 4 processes stopped.
atmiclt21: no process found
***** FINISHED TEST: [test021_xafull/run.sh] with 0 *****
Running "main"...
Running "main"...
Completed "main": 21 passes, 0 failures, 0 exceptions.
```

## Chapter 5

# Conclusions

At finish you have a configured system which is ready to process the transactions by Enduro/X runtime. It is possible to copy the binary version (*dist*) folder to other same architecture machine and run it there without need of building. This process is described in [\[BINARY\\_INSTALL\]](#) guide.

## Chapter 6

# Additional documentation

### 6.1 Resources

[1] [BINARY\_INSTALL] See Enduro/X binary\_install manual.