Xnee Manual

Xnee Manual

Xnee is a suite of programs with,
recording, replaying and 'distribution'
capabilities for X Window System
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Short Contents

1 Summary

1.1 Summary

Xnee is a suite of programs that can record, replay and distribute user actions under the X11 environment. Think of it as a robot that can imitate the job you just did.

Xnee consists of one library and two applications

cnee - command line program

gnee - graphical user interface program

pnee - a Gnome Panel Applet

libxnee - library used by xnee and gnee

1.2 Xnee features

Xnee can be used for multiple purposes, although it was initially designed as a test tool. The most used features are the foloowing:

Test tool - Instead of performing test cases for a GUI (or CLI program) over and over again, the test cases can be automated. Simply record a user session and replay it later.

Performance test tool - If you want to simulate lots of simultaneous users in a network (or a local machine) you can use Xnee. Simply record a user session and start multiple instances of Xnee.

Demonstration tool - You can use Xnee to demonstrate the features of your program. Simply record a user session and replay it later.

Distribution tool - If you want to send over your mouse/keyboard actions to another display you can use the built-in distribution mechanism in Xnee.

Macro recorder/replayer - By binding a key and modifier combination (e.g using xrebind) to replay a recorded session you will have a Window Manager and application independent macro.

File retyper - Xnee can retype the contents of a file. This can be useful during tests or if you want xnee to answer some command session without having to record the session.

X11 protocol sniffer - Xnee can be used as a sniffer for the X11 protocol.

1.3 Background

In order to verify that a program does the job it's supposed to do, certain tests have to be made. These tests are, IMHO, perhaps the most boring things a programmer can do. Xnee is designed to reduce the programmer from this burden.

Xnee started out as a commad line program. During the development phase the main functionality was broken out to a library, called libxnee. The command line program was renamed cnee. The thought behind making the library was to enable the writing of other clients than just the command line. Today there is a GUI program, gnee, and a Gnome panel applet, pnee, that uses the library.

By using xnee your testcase(s) can be recorded and later on replayed. Xnee comes with other features For more information about these, read the Introduction.

This manual mainly focuses on the command line program, cnee. There are however a seperate chapters for the other programs.

2 Getting started

2.1 Getting started

To get the first feel of Xnee some simple examples are presented.

2.1.1 Simple replay

Start a terminal emulator (e.g xterm) and then start Xnee,

```
cnee --replay --file example1.xnr &
```

....dont forget '&'. The file example1.xnr contains keyboard events recorded during development of this manual. When replayed you'll see what was typed and of course more important you'll get i first glimpse of Xnee and its capabilities. For information on where to find the example files, see below.

2.1.2 Simple recording of Key presses

We move on to a (very) simple recording session. Start a terminal emulator (e.g xterm) and your favorite editor. Move the pointer to one of the terminal windows and start Xnee.

```
cnee --record -o example2.xnr --device-event-range 2-3 \
--time 5 --events-to-record 20
```

Move the pointer to the editor and get focus (e.g click the window frame). After 5 seconds you can type whatever you want to record (20 press- and relase events of the keyboard are recorded). We are done and you have recorded your first session! Leave the desktop as it is and go forward to the next example.

2.1.3 Simple replaying of your recorded file

Start one terminal emulator (e.g xterm). Let Xnee repeat the stuff you did in the example above. Undo all changes in the editor that was made in the previous example. Move the pointer to one of the terminal windows and start Xnee.

```
cnee --replay -f example2.xnr --time 5
```

Move the pointer to the editor and get focus (e.g click the window frame). After 5 seconds you will see your typings in the example above being repeated.

2.1.4 Simple recording of mouse motions

We move on to another simple recording session. Start a terminal emulator (e.g xterm). Move the pointer to the terminal window and start Xnee.

```
cnee --record -o example3.xnr --device-event-range 5-6 \
--time 5 --events-to-record 20
```

After 5 seconds you can move the pointer around (20 motion events are recorded).

2.1.5 Simple replaying of your recorded file

Let Xnee repeat the stuff you did in the example above.. Move the pointer to the terminal window and start Xnee.

```
cnee --replay -f example3.xnr --time 5
```

After 5 seconds you will see your mouse motions in the example above being repplayed.

2.1.6 Simple retyping of a text file

Let Xnee retype (type again) the text in a text file. Move the pointer to the terminal window and create a text file containing the command `ls -l`.

```
echo "ls -l" > ./mytext.txt
```

And after that you start Xnee.

```
cnee --retype-file  ./mytext.txt --time 5
```

After 5 seconds you will see Xnee type `ls -l`, which probably will list the files in the current directory.

2.1.7 Example Xnee Session files

The example file above (example1.xnr) is a session file that has been delivered with the sources (allthough not installed), rpm and with the Xnee Documentation Package. The file(s) can be found:

Distribution	**Location**
RPM	/usr/lib/xnee/session
Source	./sessions/
Document Package	./sessions/

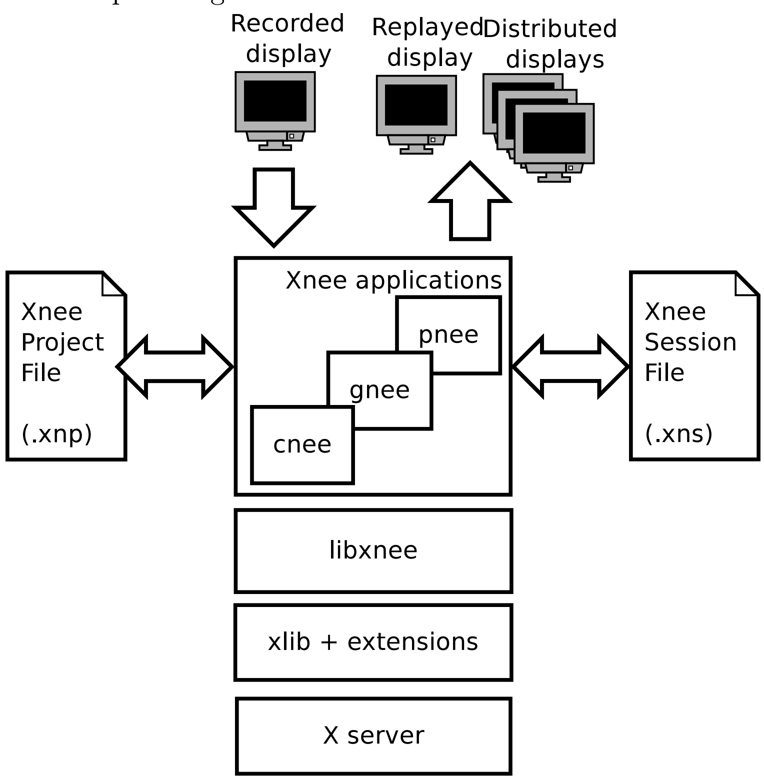
3 Functional overview

3.1 Functional overview

The Xnee applications (gnee and xnee) receives X11 protocol data (e.g. events) from an X server (using libxnee) and print them to a file, called Xnee Session File. Theses events are later read from the session file and replayed. Gnee and xnee can read its settings from a file, called Xnee Project File, or from command line (cnee) or via the GUI (gnee).

Events directly generated by the user (e.g KeyPress) can be replayed or faked. Requests, replies, errors and events not directly generated by the user (e.g MapNotify) can be recorded as well. By using these data Xnee can replay with synchronisation.

This picture gives an overview of Xnee and the files used.



In this section you will be given information about key concepts in X11 and Xnee. It is vital that you read through this chapter.

3.2 Modes

Xnee has four modes:

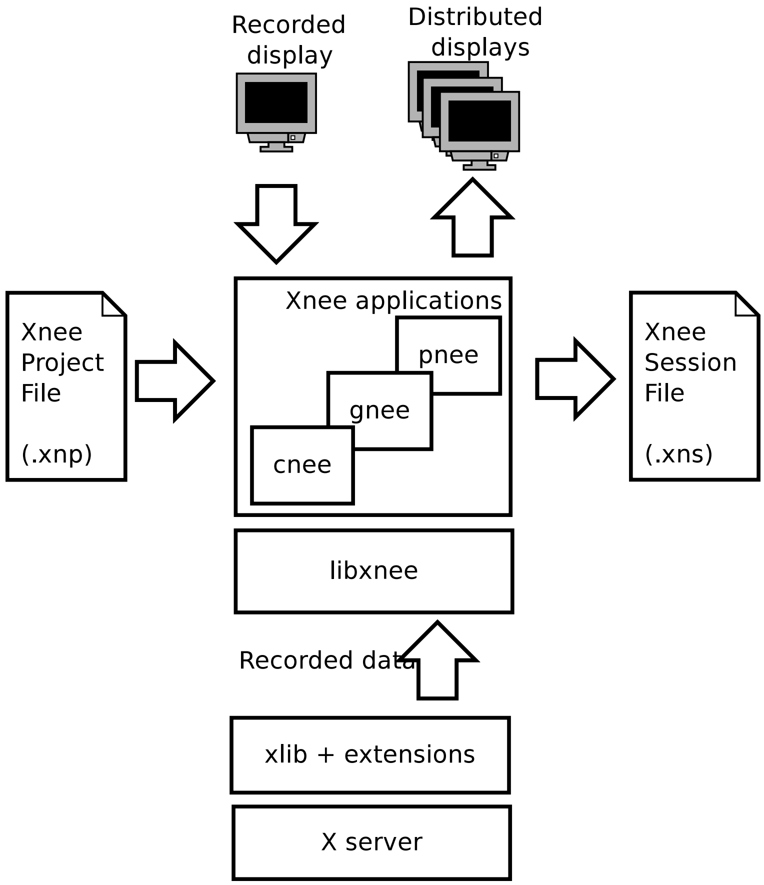
- record
- replay
- retype
- distribute

The distribution mechanism can be used together with the other three.

3.2.1 Record

When record mode is used Xnee receives a copy of the data sent to and from the X server. The copy is printed to a file. Xnee can record the whole X11 protocol, not just mouse and keyboard events.

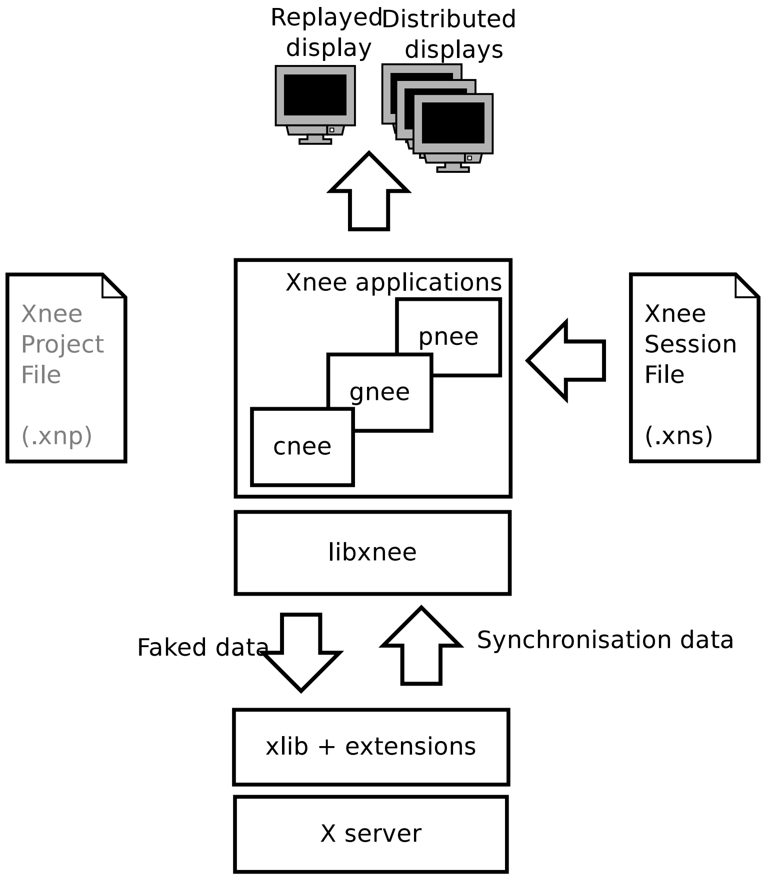
This picture gives an overview of Xnee and the files used when recording.



3.2.2 Replay

When replay mode is used Xnee reads data from a file or stdin. These data is either sent to the server (if it is a keyboard or a mouse event) or used to synchronise with (if any of the other data).

This picture gives an overview of Xnee and the files used when replaying.



3.2.3 Retype

Xnee can retype the contents of a text file. This is useful when combining replaying of different recorded session. You can change the text written in for example an editor (e.g emacs) without having to re-record the complete sessions.

3.2.4 Distribution

Xnee can fake mouse and keyboard events on multiple displays. This distribution mechanism can be used when recording, replaying or retyping.

3.3 Ranges

What data to record is specified using ranges. Ranges has a start value and a stop value. The following data can be recorded:

Xnee name	**X Protocol Name**
core-requests	Request
device-event	Event

delivered-event	Event
error	Error
reply	Reply
ext-requests.ext-major	Extension Request
ext-requests.ext-minor	Extension Request
ext-replies.ext-major	Extension Reply
ext-replies.ext-minor	Extension Reply

When specifying the ranges when using xnee you can either type the integer value of the data or the name of the data. To find out what number belongs to what data name, you can use the `--print-data-name` option. For an explanation of the X protocol data, please read the "X Record Extension Library" or the "Record Extension Protocol Specification".

3.4 First and last motion event

Xnee has the ability to skip recording of succesive motion events with no other data in between. This option is intended to reduce the number of data recorded by leaving out unnecessary data. This feature can be invoked with the `--first-last` flag.

3.5 Delay

Sometimes when Xnee starts recording data, the keyrelease (caused by pressing and releasing RETURN to execute the Xnee command line) is recorded. This single keyrelease (with no corresponding keypress) might confuse the X server. With the `--time <secs>` option Xnee can be paused for a number of seconds before recording/replaying/retyping starts.

3.6 Verbose

When enabling verbose mode (`--verbose`) Xnee prints a lot of information about it's state. This option is only intended for runtime debugging.

3.7 Human printouts

Sometimes it's hard to decide what data to use when synchronising. To do this you have to analyse what data is sent from the server when recording. Instead of reading the data number, s tring representation of the data is printed out. To enable this option, use the `--human-printouts`.

3.8 Invoking Xnee

3.8.1 Command line syntax

To get information about how to use Xnee's command line options please use the man page(s).

3.8.2 Project file

To use a Project file use the `--project` option, e.g `cnee --project xnee/projects/netscape.xns`

3.8.3 Session file

To use a session file use the `--file` option, e.g `cnee --file user1_session.xns`

3.9 Interupting Xnee

Interupting Xnee when recording or replaying can be done as follows

- user specified modifier and key
- limit the number of data to record
- sending a SIGTERM signal (e.g pressing Control-c in a terminal window)

The prefered way to interrupt xnee is to use the modifier+key.

3.9.1 modifier and key

It is possible to specify a modifier (e.g Control button) and a key (e.g 'a') that will stop the Xnee session. When using this option make sure that the modifier/key is not used in any way by the applications you are recording. You can specify a key+modifier to stop, pause and resume xnee. You can also insert a mark in the recorded session file.

3.9.2 limit the number of data to record

By specifying the number of data to record (`--loops`) xnee stops when this number of data is received from the server. When replaying the same amount of data is replayed.

3.9.3 sending a SIGTERM signal

The easiest way to send a signal to a process is by launching Xnee from a terminal window (e.g xterm) and then press Control-c which will send the SIGTERM signal to Xnee. When replaying it can sometimes be hard to move the pointer into the terminal window (e.g if a lot of motion events were recorded that will let you compete with Xnee on where the mouse pointer shall be located. Beleive me, you'll end up lossing that battle).

When using Control-c to stop Xnee you must be aware of that the pressing of the Control key gets recorded. When replaying a recorded session ending with pressing of Control your apps may think you are pressing the Control key. A simple solution for this is to press and release the Control.

3.9.4 Stop Xnee with key combination

Xnee stops its current action when the user presses the key combination as specified during setup. Xnee will be shut gracefully.

3.9.5 Pause Xnee with key combination

Xnee pause its current action when the user presses the key combination as specified during setup. Xnee will be in paused mode until the user stops or resumes Xnee.

3.9.6 Pause Xnee with key combination

Xnee resumes its current paused action when the user presses the key combination as specified during setup. Xnee will continue where it was paused.

3.9.7 Insert marks Xnee with key combination

When the user presses the key combination as specified during setup Xnee will print a mark in the session file containing a time stamp. This feature is intended be used when you want to mark an interresting time/event during recording. After recording has finished you can add Xnee scripting calls to Xnee which will be interpreted and executed as if they were recorded.

3.9.8 Limit number of data to record

There a a few ways to limit the number of data Xnee records.

- limit the events to recored
- limit the data to recored
- limit the time to recored
- send a signal to xnee (SIGTERM)
- use a selfmade record callback function

3.9.9 Limit the events to record

When having received the specified amount of events from the server, Xnee stops the recording. For more information on how to use this option, read the man page for cnee or the user manual for gnee.

3.9.10 Limit the data to record

When having received the specified amount of data from the server, Xnee stops the recording. For more information on how to use this option, read the man page for cnee or the user manual for gnee.

3.9.11 Limit the time to record

When having recorded for the specified amount of time from the server, Xnee stops the recording. For more information on how to use this option, read the man page for cnee or the user manual for gnee.

3.9.12 Send SIGTERM to Xnee

The easiest way to send a signal to a process is by launching Xnee from a terminal window (e.g xterm). By pressing Control-c xterm sends the SIGTERM signal to Xnee. When replaying it can sometimes be hard to move the pointer into the terminal window (e.g if a lot of motion events were recorded that will let you compete with Xnee on where the mouse pointer shall be located. Beleive me, you'll end up lossing that battle).

3.10 Xnee plugins

Xnee supports plugins since version 1.07. For information about how to write plugins, download the source code and look at the plugin example which is delivered with Xnee.

4 Installation

4.1 Installation from source with the configure script

To build and install Xnee do the following: Download the following source files into a directory (version numbers given here are just examples)

- xnee-3.02.tar.gz

Unzip the source file

```
gunzip xnee-3.02.tar.gz
```

Untar the source file

```
tar xvf xnee-3.02.tar
```

Enter the Xnee directory

```
cd xnee-3.02
```

Generate the makefiles

```
./configure
```

or if you want to specify which directory to install xnee to

```
./configure --prefix=<PATH TO INSTALLATION DIR>
```

Build Xnee

```
make clean all
```

Install (as root) if you want libxnee to be installed. If not, skip the following command. Installation of libxnee is not needed to build cnee and gnee.

```
make install
```

4.2 Installation from source with default Makefile

To unpack, build and install Xnee from the sourcefiles do the following:
Download the source files into a directory

Unzip the source file

```
gunzip xnee-3.02.tar.gz
```

Untar the source file

```
tar xvf xnee-3.02.tar
```

Enter the Xnee directory

```
cd xnee-3.02
```

Build Xnee

```
make -f Makefile.xnee clean all
```

Copy the Xnee binary (xnee/src/xnee) to a directory

```
cp xnee/src/xnee /usr/local/bin
```

4.3 Installation from CVS

Download the xnee source code from the CVS repository at `http://savannah.gnu.org`. Instructions on how to do this can be found there as well.

Build Xnee

```
cd xnee
make -f Makefile.cvs
./configure --enable-doc
make
make install (optional)
```

Build Xnee Documentation

```
cd doc
make manual
make install (as root)
cd ..
```

5 Examples

5.1 Recorder

5.1.1 Record mouse motions

Record mouse motions only and save the session to mouse-rec.xnl.

```
cnee --record --mouse --out-file mouse-rec.xnl
```

After having typed this you can move your mouse round for a while. After Xnee has exited you will be able to replay your motions. Xnee will stop after having record 100 events (this is the default behaviour).

5.1.2 Record keyboard

Record keyboard events only and save log to kbd-rec.xnl.

```
cnee --record --keyboard --out-file kbd-rec.xnl
```

After having typed this Xnee records all your keyboard actions. After Xnee has exited you will be able to replay your keyboard actions. Xnee will stop after having record 100 events (this is the default behaviour).

5.1.3 Record keyboard and mouse

Record keyboard and mouse and save log to km-rec.xnl.

```
cnee --record --keyboard --mouse --out-file kbd-rec.xnl
```

After having typed this Xnee records all your keyboard and mouse actions. So now move your pointer and write some stuff with your keyboard. After Xnee has exited you will be able to replay your keyboard and mouse actions. Xnee will stop after having record 100 events (this is the default behaviour).

5.1.4 Record a gnumeric session

Record a gnumeric session. Record 400 events. Save output in file gnumeric.xnl Start a terminal emulator (e.g xterm)

```
xterm&
```

Start Xnee

```
cnee --record --keyboard --mouse --events-to-record 400 \
 --out-file gnumeric.xnl&
```

Start gnumeric

```
gnumeric&
```

Start using gnumeric. Browse the menus above, reset the fonts etc.

5.1.5 Record a gnumeric session with synchronisation data

Record a gnumeric session. Record 400 events. Save output in file gnumeric2.xnl

Start a terminal emulator (e.g xterm) `xterm&`

Start Xnee

```
cnee --record --keyboard --mouse --events-to-record 400 \
 --out-file gnumeric2.xnl\
--delivered-event-range Expose,MapRequest,LeaveNotify,EnterNotify  &
```

Start gnumeric `gnumeric&` Start using gnumeric. Browse the menus above, reset the fonts etc.

5.2 Replayer

5.2.1 Replay mouse motions

Replay mouse motions as found in the file mouse-rec.xnl.

```
cnee --replay  --file mouse-rec.xnl
```

Xnee will now imitate exactly what you did when you recorded this file.

5.2.2 Replay mouse motions using with half speed

Replay mouse motions as found in the file mouse-rec.xnl but with the speed set to 50% of the recorded.

```
cnee --replay  --file mouse-rec.xnl --speed-percent 50
```

Xnee will now imitate exactly what you did when you recorded this file, allthough it will be done in 50% of the recorded time.

5.2.3 Replay mouse motions using with double speed

Replay mouse motions as found in the file mouse-rec.xnl but with the speed set to 200% of the recorded.

```
cnee --replay  --file mouse-rec.xnl --speed-percent 200
```

Xnee will now imitate exactly what you did when you recorded this file, allthough it will be done twice as fast as when recorded.

5.2.4 Replay keyboard actions

Replay keyboard events from file kbd-rec.xnl.

```
cnee --replay --file kbd-rec.xnl
```

After having typed this Xnee replays all your keyboard actions. After Xnee has exited you will be able to replay your keyboard actions.

5.2.5 Replay keyboard and mouse

Replay keyboard and mouse from the file km-rec.xnl.

```
cnee --replay --keyboard --mouse --file kbd-rec.xnl
```

After having typed this Xnee replays all your keyboard and mouse actions. Xnee moves your pointer and writes the the same stuff as you did when recording.

5.2.6 Replay a gnumeric session

Replay the gnumeric session above
Start a terminal emulator (e.g xterm) `xterm&` Start a new fresh gnumeric spreadsheet `gnumeric&`

Start Xnee

```
cnee --replay  --file gnumeric.xnl
```

Xnee will now do the same stuff you did when recording. It may happen that some user actions are replayed to early. This is so because Xnee has no way of knowing if it is in sync with the recorded session.

5.2.7 Replay a gnumeric session with synchronisation data

Replay the second gnumeric session above.
Start a terminal emulator (e.g xterm) `xterm&` Start a new fresh gnumeric spreadsheet `gnumeric&`

Start Xnee

```
cnee --replay  --file gnumeric2.xnl
```

Xnee will now do the same stuff you did when recording. It may happen that the replaying slows down. This is because Xnee is currently out of sync. When being out of sync Xnee slows down a bit and checks the thresholds if it is allowed to continue. Xnee will most probably find itself in sync after a short while. All recorded user actions should have occured the same way as when recording.

5.2.8 Replay a gnumeric session with synchronisation data setting threshold

Replay the second gnumeric session above.
Start a terminal emulator (e.g xterm) `xterm&` Start a new fresh gnumeric spreadsheet `gnumeric&`

5.3 Retyper

5.3.1 Retype the help printout

If you want Xnee to fake a user typing the help printout from xnee you can use the `--type-help` option.
Start a terminal emulator (e.g xterm) and an editor (e.g emacs).

```
xterm &
emacs &
```

Retype the help printout by starting xnee with a 10 seconds delay delay.

```
cnee --time 10 --type-help
```

Move your mouse to the editor and make the editor have focus. Wait a few seconds and xnee will type the help. You will now also have a copy of help text.

5.3.2 Retype a file

If you want Xnee to fake a user typing the letters as found in a text file you can use the retype mode. Note that it isn't possible to retype all characters yet. This will be implemented as soon as possible. We'll give an example on how to use this mode.
Start a terminal emulator (e.g xterm)

```
xterm &
```

Create a text file

```
echo "Hi Xnee" > testfile.txt
```

Retype the contents of this file to another file by starting xnee with a 10 seconds delay delay.

```
cnee --time 10 --retype-file testfile.txt
```

Start the fabulous editor `cat`

```
cat > copiedfile.txt
```

Wait a few seconds and xnee will retype the letters in the file `testfile.txt`. You will now also have a copy of that file. The copy is called copiedfile.txt. This is a realy a stupid way to copy a file but this option opens up a few possibilities.

5.4 Distributor

With the distribution mode Xnee can send your device events to multiple displays.

5.4.1 Distribute your mouse motions

You can distribute your mouse motions to the displays frodo:0.0 and sam:0.0
Start a terminal emulator (e.g xterm)

```
xterm &
```

Start xnee

```
cnee --distribute frodo:0,sam:0.0
 --record --mouse
```

If you have setup authority correct on frodo and sam you will see all you mouse motions being done on those displays as well.

5.4.2 Distribute the replaying of mouse motions

Replay and distribute mouse motions as found in the file `mouse-rec.xnl`.

```
cnee --replay  --file mouse-rec.xnl
 --distribute frodo:0,sam:0.0
```

Xnee will now imitate exactly what you did when you recorded this file on your host as well on frodo and sam.

5.4.3 Distribute the retyping of a file

If you want Xnee to to distribute the fakeing of a user typing the letters as found in a text file you can use the retype mode together with the distribution mode.
Start a terminal emulator (e.g xterm) on each of the hosts

```
xterm &
```

Create a text file.

```
echo "Hi again Xnee" > distfile.txt
```

Retype the contents of this file to another file by starting xnee with a 10 seconds delay delay.

```
cnee --time 10 --retype-file distfile.txt
 --distribute frodo:0,sam:0.0
```

Start the fabulous editor `cat` on the terminal emulators on each the terminals.

```
cat > copiedfile.txt
```

If you have setup authority correct on frodo and sam you will, after a few seconds, see xnee retype the letters in the file `distfile.txt`. You will now also have three copies of that file. On copy on each host. The copy is called copiedfile.txt. This might seem like a stupid way to copy a file to three locations but this is just an example.

5.5 Key

5.5.1 Stop Xnee with key

You can stop xnee by specifying a key. Make sure that this key isn't grabbed by another X client (e.g by the Window Manager). Let's say that you want Xnee to stop recording if you press Control and h.

```
cnee --record --mouse --events-to-record -1 --stop-key h
```

This will make xnee record mouse events until you press h. All printouts are done to stdout so you can see that Xnee stops when you press the key.
Move your mouse for a while and you'll see xnee print out lots of lines.
Press h.
Xnee will now have stopped recording.

5.5.2 Pausing and resuming Xnee with key

You can pause and resum xnee by specifying a key. Make sure that this key isn't grabbed by another X client (e.g by the Window Manager). Let's say that you want Xnee to pause recording if you press p and to resume when pressing Comntrol and r.

```
cnee --record --mouse --events-to-record -1 --pause-key p \
--resume-key r
```

This will make xnee record mouse events until you press p. All printouts are done to stdout so you can see that Xnee stops when you press the key.
Move your mouse for a while and you'll see xnee print out lots of lines.
Press p.
Xnee will now have paused recording. Move your mouse for a while and note that nothing is printed.
Press r.
Xnee will now have resumed recording. Move your mouse for a while and note that xnee begins its printouts.

5.6 Using macro

Macors can be used in various applications allthough many applicaions have a macro functionality built in (e.g emacs).

5.6.1 Define a simple macro

There are plenty of tools that bind a key combination to different actions. For various reasons the author of this manual is familliar with xrebind so we will use xrebind in this example.

The first thing to do is to decide which key combination to tie to the wanted action. Let's say we want to use one of the funtion keys, F1. We then have to find out which keycode belongs to that key. The action we will bind to this key combination will be the replaying of a recorded session from the previous examples.
We use Xnee to find the keycode for F1. Start xnee.

```
cnee --record --keyboard --events-to-record 20
```

Press the F1 key and see what number was printed out. It will look something like this:

```
0,2,0,0,0,67,0,90300078
0,3,0,0,0,67,0,90300156
```

The interesting part here is the 6th column. In our example we find 67, which is the keycode for F1.
Now we move on to setup xrebind to grab F1 and bind that to replay the mouse motions from the file `mouse-rec.xnl`. Open or create a new file in your home directory called `.xrbrc` and add the lines.

```
XrebindGrab
{
  Action      = Execute
  GrabKeycode = 67
  Modifier    = AnyModifier
  Command     = xnee  --replay --file mouse-rec.xnl
  Comment     = Starting xnee replay
  AutoRepeat  = false
  Fork        = true
}
```

Let's try it. Start xrebind with verbose printouts.

```
xrebind --verbose
```

Press F1 and the recorded session from the previous example shall be replayed. You can also see in the verbose printouts that xrebind executes xnee.

5.6.2 Define another simple macro

Let's say we want to bind Control and e to execute the session as in the example above. This time setting up xrebind is a bit easier.
Setup xrebind to grab F1 and bind that to replay the mouse motions from the file `mouse-rec.xnl` by opening or create a new file in your home directory called `.xrbrc` and add the lines.

```
XrebindGrab
{
  Action      = Execute
  GrabKey     = e
  Modifier    = Control
  Command     = xnee  --replay --file mouse-rec.xnl
  Comment     = Starting xnee replay
  AutoRepeat  = false
  Fork        = true
}
```

```
e, Control, Exec, xnee,  --replay --file mouse-rec.xnl, \
Fork, NoAutoRepeat
```

Let's try it. Start xrebind with verbose printouts.

```
xrebind --verbose
```

Press Control and e and the recorded session from the previous example shall be replayed.

5.7 Various options

5.7.1 Using verbose mode

To enable verbose mode, start xnee like this

```
cnee --verbose --record --mouse
```

Move the mouse for a while and you'll lots of verbose printouts that usualy isn't there.

5.7.2 Using human readable printouts

To enable human printout mode, start xnee like this

```
cnee --human-printout --record --mouse
```

Move the mouse for a while and you'll see the data printed out in an almost human friendly format.

5.7.3 Using a differet screen resolution

If a session was recorded on a screen with another resolution than on the one where we replay the session xnee will translate all coordinates automagically. However, you can force xnee to use a specific resolution when replaying. To do this, start xnee like this

```
cnee --replay --file mouse-rec.xnl \
--replay-resolution  800x600
```

Xnee will now replay the events recorded in the sessions file `mouse-rec.xnl` as if the screen has a resolution of 800x600.

5.7.4 Using a offset when replaying

If a session was recording a centered window with a window manager and is to bo replayed without a window manager (still centered) you can use the offset switch to make Xnee replay the events in order to get the coordinates right.

```
cnee --replay --file mouse-rec.xnl \
--replay-offset 12,-7
```

Xnee will now replay the events recorded in the sessions file `mouse-rec.xnl` and adding 12 to the x coordinate and subtract 7 from the y coordinate.

5.7.5 Using a window position recall

For some reason a replayed window may pop up at a different position as when recorded. Xnee can try to solve this by adding the `recall-window-position` option during replay.

```
cnee --replay --file mouse-rec.xnl \
--recall-window-position
```

If a window pops up at a different position when replaying (as whe recorded) Xnee moves the new window to the same position as when recorded.

5.7.6 Using no resolution translation

If a session was recorded on a screen with another resolution than the on the one where we replay the session xnee will translate all coordinates automagically. However, you can force xnee not to use translation. To do this, start xnee like this

```
cnee --replay --file mouse-rec.xnl \
--no-resolution-adjustment
```

Xnee will now replay the events recorded in the sessions file `mouse-rec.xnl` as if the screen had the same resolution the recorded one.

5.7.7 Record another display than the default

If you want to record another display than the default, as set in the DISPLAY variable, you use the `--display` option.

```
cnee --record --mouse --display frodo:0.0
```

Xnee will now record the mouse events on the display frodo:0.0.

5.7.8 Replay to another display than the default

If you want to replay to another display than the default, as set in the DISPLAY variable, you use the `--display` option.

```
cnee --replay --display frodo:0.0 --file mouse-rec.xnl
```

Xnee will now replay the mouse events on the display frodo:0.0.

5.8 Shell scripts using Xnee

Insted of onvoking Xnee for every time you need to fake events you can make use of the shell functions as delivered with Xnee. With these functions you can start one instance of Xnee and fake device events whenever you need.

```
#!/bin/bash

# Source in handy functions
. /usr/share/xnee/xnee.sh

# Loop and press buttons
TMP=0
while [ $TMP -le 5]
do
  TMP=$(($TMP+1))
  xnee_fake_button $TMP
done

# Just a simple example ....don't bother to understand
tar cvf /tmp/crap.tar *
sleep 2

# Fake ls and Enter
```

```
xnee_fake_key l
xnee_fake_key s
xnee_fake_key XK_Return
```

This example will fake press and release of the mouse button and do fake press and release of ls followed by a press and release of Enter.... and of course, you'll get a tar file in /tmp.

Make sure that the path to the `xnee.sh` is correct.

6 Xnee Programs

GNU Xnee consists of three different programs, cnee, gnee and pnee.

6.1 cnee - cnee's not an event emulator

This is the Xnee command line program. This programs contains most features and is the basis for this documentation.

For a user not used to X11 it is probably a good idea to start with gnee or pnee instead or start using cnee in demonstration mode: `cnee --demo`

6.2 gnee - gnee's not an emulator either

This is a GUI (using GTK2/Gnome) with most of the features of cnee. The GUI has been designed for ease of use.

Currently there are no plans for making a separate manual for gnee.

6.3 pnee - pnee's not even emulating

This is a Gnome panel applet with a minimal set of features. Ease of use is the motto for this program. It is intended for users not being experts on X11 but still wants to record and replay a session for what ever purpose. By default pnee have settings that need not be changed for most cases. You can, however, launch the preferences dialog and set your preferred values as in most other applets.

If you find pnee a bit limited we suggest you switch over to using cnee.

Note: If pnee hangs you can press the stop button twice to make a reset. Hopefully this will solve the problem.

6.3.1 Reporting pnee bugs

By default pnee writes error, verbose printouts and warnings to stderr which will not be visible to you as a user, since pnee will be started automatically along with the other applets. If you start up the preferences dialog you can choose a file for pnee printouts. After that you should turn on verbose logging (also in the preferences dialog) and then reproduce the bug and send over the file to `xnee-bug@gnu.org`.

7 File types and format

The files used by Xnee are

- Xnee Project File
- Xnee Session File

These files must follow the Xnee File Format.

7.1 Project file

Xnee can be set either using command line options (when using xnee) or by clicking the correct buttons etc in the GUI (using gnee). Instead of setting the same settings over and over again, you can use the Xnee Project File.

7.1.1 Create a project file

You can create a project by yourself. This can be done using the `write-settings` option in cnee or the "save settings to file" when using gnee or you can use the Xnee GUI (gnee) to write one. You can also write one by yourself in your favorite editor. Just make sure you follow the Xnee format. For information and specification on this format read the Xnee format chapter.

The authors of Xnee suggests you start off with a generated project file. To get one such file, type the following `cnee --mouse --keyboard --write-settings new_proj.xnp`. You will now have a file `new_proj.xnp` with some useful values, which you can edit as you wish.

To use this file to record, simply type `cnee --record --project new_proj.xnp`

7.2 Xnee Session file

The Xnee session files are the printouts from a recorded session following the Xnee File Format. For information and specification on this format read the Xnee File Format chapter.

7.3 Xnee file format

The Xnee Format is divided into different directives. The format is line based, meaning that

- there is one directive per line
- one line contains one (and only one) directive

These directives are definied as follows.

7.4 Xnee directives

The following directives are used in Xnee:

Directives	**Description**
Comment	This is used to comment the various files

Project	These contains information about the session- or project file
Settings	Data used when recording and replaying
Replay data	Recorded replayable data (used when replaying)
Script replay data	Scriptable primitives
Mark	Lines inserted in the seesion file when a modifier+key was pressed
Execution	Lines that trigger the execution of an external program
Project information	Project

7.4.1 Comment

First token	Interpretation
#	The whole line is ignored.

As long as the first token is **#** the whole line is intrepreted as a comment, just as in bash.

7.4.2 Settings

Settings directive	Argument	Interpretation
data-to-record	integer	Limits the number of data to record to to the integer value
events-to-record	integer	Limits the number of events to record to to the integer value
time-to-record	integer	Limits the number of seconds to record to to the integer value
display	string	Sets the display to record or replay to the string
distribute	string	Distribute all recorded or replayed replayable events to the display given by the string
file	string	Read replay data from the file given by the string
out-file	string	Print recorded data to the file given by the string
plugin	string	Use the plugin given by the string

first-last	boolean	Print only first and last of successive MotionNotify events
verbose	boolean	Use verbose debugging printout
buffer-verbose	boolean	Use verbose buffer verbose printouts (not built by default)
time	integer	Delay the start of the Xnee action
all-clients	boolean	Record all curret and future clients (default)
future-clients	boolean	Record only future clients
human-printout	boolean	Prints the recorded data in a (quite) more ser friendly format
sync-mode	boolean	Sets recording mode
speed-percent	integer	Sets the replaying speed percentage to the integer value
stop-key	string	Sets the stop key combination to the string
pause-key	string	Sets the pause key combination to the string
resume-key	string	Sets the resume key combination to the string
mark-key	string	Sets the mark key combination to the string
exec-key	string	Sets the execute key combination to string
replay-resolution	string	Sets the replay resolution to the string
replay-resolution	string	Sets the replay resolution to the string
recall-window-position		Use window position recall during replay
resolution-adjustment	boolean	Use resolution adjustment, even if the recored resolution differs from the one to replay to
event-range	range	Sets the events to record
error-range	range	Sets the errors to record to range*
request-range	range	Sets the request to record to range*

reply-range	range	Sets the replies to record to range*
extension-request-major-range	range	Sets the extension requests (major) to record to range*
extension-request-minor-range	range	Sets the extension requests (minor) to record to range*
extension-reply-major-range	range	Sets the extension replies (major) to record to range*
extension-reply-minor-range	range	Sets the extension replies (minor) to record to range*
force-replay	boolean	Continue to replay even if Xnee is out of sync
max-threshold	integer	Sets the maximum synchronisation threshold
min-threshold	integer	Sets the minimum synchronisation threshold
total-threshold	integer	Sets the total maximum synchronisation threshold
events-to-record	integer	Sets the number of events to record
data-to-record	integer	Sets the number of data to record
time-to-record	integer	Sets the number of seconds to record
store-mouse-position		If set, Xnee records the initial mouse position and makes sure that replaying starts from there
retype-press-delay	integer	Xnee delays processing after a faked key press (during retype) with integer milli seconds
retype-release-delay	integer	Xnee delays processing after a faked key press (during retype) with integer milli seconds

Settings argument	**Description**	**Example**
`integer`	is an integer value.	1
`string`	is a string.	localhost
`boolean`	is a boolean value given by true/1 or false/0	true, false, 0, 1
`subrange`	Subrange is gives a range of data by specifying a start and stop data. In the case of one data the stop data can be omitted.	2-5 or MapNotify

`range`	Ranges are a comma separated list of subranges.	2-3,MotionNotify-MapNotify,GravityNotify,PropertyNotify,30

7.4.3 Replay

Replay directive	Interpretation
0,0	not valid
0,1	not valid
0,2,void,void,void,keycode,screen,time	KeyPress on key with keycode, used to replay
0,3,void,void,void,keycode,screen,time	KeyRelease on key with keycode, used to replay
0,4,void,void,button nr,void,screen,time	ButtonPress on button nr, used to replay
0,5,void,void,button nr,void,screen,time	ButtonRelease on button nr, used to replay
0,6,x,y,void,void,screen,time	MotionNotify on poistion (x,y), used to replay
1,request number, request type, length, request id, time	Recorded request, used during synchronisation
2,reply number,time	Recorded reply, used during synchronisation
3,error number,time	Recorded error, used during synchronisation
6,EB+2,void,void,void,keycode,screen,time	X Input (master) KeyPress on key with keycode, used to replay
6,EB+3,void,void,void,keycode,screen,time	X Input (master) KeyRelease on key with keycode, used to replay
6,EB+4,void,void,button nr,void,screen,time	X Input (master) ButtonPress on button nr, used to replay
6,EB+5,void,void,button nr,void,screen,time	X Input (master) ButtonRelease on button nr, used to replay
6,EB+6,x,y,void,void,screen,time	X Input (master) MotionNotify on poistion (x,y), used to replay
6,EB+2,void,void,void,keycode,screen,time	X Input (slave) KeyPress on key with keycode, used to replay

6,EB+3,void,void,void,keycode,screen,time	X Input (slave) KeyRelease on key with keycode, used to replay
6,EB+4,void,void,button nr,void,screen,time	X Input (slave) ButtonPress on button nr, used to replay
6,EB+5,void,void,button nr,void,screen,time	X Input (slave) ButtonRelease on button nr, used to replay
6,EB+6,x,y,void,void,screen,time	X Input (slave) MotionNotify on poistion (x,y), used to replay

time is the time on the server the data was to the recording Xnee client. This time is used to keep the speed intact during replay.

7.4.4 Script replay data

Primitive	**Interpretation**
fake-motion	Fakes a mouse motion
fake-button-press	Fakes a button press
fake-button-release	Fakes a button release
fake-button	Fakes a button press and release
fake-key-press	Fakes a key press
fake-key-release	Fakes a key release
fake-key	Fakes a key press and release

Primitive variable	**Primitive values**	**Interpretation**
x=value	integer	Sets the x position used in fake-motion to value
x=value	+integer	Set the relative motion (x direction) used in fake-motion to value
x=value	-integer	Set the relative motion (x direction) used in fake-motion to value
y=value	integer	Sets the y position used in fake-motion to value
y=value	+integer	Set the relative motion (y direction) used in fake-motion to value

y=value	-integer	Set the relative motion (y direction) used in fake-motion to value
button=value	integer	set the button to fake with fake-button-press, fake-button-release and fake-button to value
key=value	integer	set the key to fake with fake-key-press, fake-key-release and fake-key to value

7.4.5 Mark

First tokens	**Arguments**	**Interpretation**
Mark	time string	Ignored. This feature is intended to let the user do whatever he/she wants to. This will obviously lead to modifying the source code etc.

7.4.6 Exec

First tokens	**Arguments**	**Interpretation**
Exec	command string	This is used during to replay to execute a given command. If no command string is found Xnee will try to read the command from the environment variable `XNEE_EXEC_COMMAND`

7.4.7 Project information

Project information directives	**Arguments**
ProjectName	string s is the project name
ProjectDescription	string s is the project description
ProjectCreationDate	string s is the project creation date
ProjectCreationProgram	string s is the name of the program that create the project file
ProjectCreationProgVersion	string s is the version of the program that create the project file
ProjectLastChangeDate	string s is the date of the last change of the project file
ProjectLastChangeProgram	string s is the name of the program that last changed of the project file

ProjectLastChangeVersion	string s is the version of the program that last changed of the project file
ProjectCurrentChangeDate	string s is the date of the current change of the project file
ProjectCurrentChangeProgram	string s is the name of the program that current changed of the project file
ProjectCurrentChangeVersion	string s is the version of the program that current changed of the project file

8 Xnee Internals

This chapter is intended to explain the internal design of libxnee. Hopefully this will lead to a better understanding of how to use Xnee and why some features exist and why some don't.

8.1 Synchronisation

We will try to go through the basics of how Xnee implements synchronisation and try to tell you, by using examples, why synhronisation is important.

8.1.1 Why synchronise

To understand why synchronisation during replay is needed an example is given.

In this example only mouse and keyboard events are recorded. Think of a session with a web browser.

During record the following is done:

- Start galeon (or another web browser) via the GNOME panel
- Press Ctrl-O which pops up a window
- Press the left button in the textfield of the popup window
- Enter the URL you want to enter (e.g `http://www.gnu.org`)
- Click on the OK button
- Then click on another URL (e.g GNU Documentation)
- Then click on another URL (e.g On-Line Documentation)

When replaying this session it is often useful to synchronise the recorded session with what's happening "right now" on the display since sometimes (or rather always) there can be different response times from the same URL.

During replay the following is done:

- Galeon is started
- Ctrl-O is typed which pops up a window
- Press the left button in the textfield of the popup window
- Enter the URL you want to enter (e.g `http://www.gnu.org`)
- Click on the OK button
- ... due to an enormous amount of visitors the GNU web server can't respond as quick as it did when recording. So when the next thing happens
- Then click on another URL (e.g GNU Documentation)
- ... the page hasn't been loaded and when the next event is replayed
- Then click on another URL (e.g On-Line Documentation)
- ... the link isn't there and we're really out of sync with the recorded session

8.1.2 How to synchronise

Instead we could record some more data than just the mouse and keyboard events.

During record the following is done:

- Start galeon (or another web browser) via the GNOME panel
- Record some X data that tells us that a window has been created
- Press Ctrl-O which pops up a window
- Record some X data that tells us that a window has been created
- Press the left button in the textfield of the popup window
- Enter the URL you want to enter (e.g `http://www.gnu.org`)
- Click on the OK button
- Record some X data that tells us that a window has been destroyed
- Then click on another URL (e.g GNU Documentation)
- Record some X data that tells us that a some text has been displayed in a window
- Then click on another URL (e.g On-Line Documentation)
- Record some X data that tells us that a some text has been displayed in a window

The non-mouse-or-keyboard events recorded (window created & text displayed) are record for synchronisation purposes.

During replay the following is done:

- Start galeon (or another web browser) via the GNOME panel
- wait for: the recorded X data to be sent again
- Press Ctrl-O which pops up a window
- wait for: the recorded X data to be sent again
- Press the left button in the textfield of the popup window
- Enter the URL you want to enter (e.g `http://www.gnu.org`)
- Click on the OK button
- wait for: the recorded X data to be sent again
- Then click on another URL (e.g GNU Documentation)
- wait for: the recorded X data to be sent again
- Then click on another URL (e.g On-Line Documentation)
- wait for: the recorded X data to be sent again

8.1.3 Synchronisation is needed

So by recording more data than just the events to be replayed we can synchornise what was recorded with what is going on when replaying. But the data has to be chosen with respect to that the data:

- differs from different sessions (Gimp and Xterm are really different)
- slows down the replay session if there are too many
- is hard to choose since the X protocol is rich
- differs (comparing record and replaying)
- can have different ordering (comparing record and replaying)

8.1.4 Different data for different kind of sessions

If we record an xterm session with all data being recorded and compare that to a recorded GIMP session with all data being recordr we can see that the data to use as synchronisation data differs. AS an example there aren't so many windows created/destryed during an xterm session.

The solve to the the problem of finding out what data to use as synchronisation data one can:

- use the project files delivered with Xnee
- analyse the application (using Xnee's `--human-printouts` option) and do some "trial and error"

8.1.5 Slow replay session due to too many synchronise data

The synchronisation itself doesn't take much time but there are timeouts that makes Xnee paues for a short while (see above). If there are many such timeouts it will lead to a slow or shaky replaying session.

8.1.6 X protocol is rich and asynchronous

For an end user (with no X expertise) it is hard to read the X protocol specification and make assumptions on what data to use.

8.1.7 Different data sent

Even if one starts up a machine from scratch (reboot) when recording and from scratch when replaying there is no guarantee that the data is sent in the same order or that exactly the same amount of data is sent.

8.1.8 Buffers and timeouts

To enable synchronisation Xnee buffers data:

- that was read in the session file but hasn't been sent during replay
- that was sent during replay but hasn't been seen in the session file being replayed

For every data read from session file (during replay) that isn't replayable (i e device event) Xnee stores the data in a buffer. Xnee also stores the data sent from the X server during playback. The data received from the server make the buffer entry for that specific data be decremented. If, on the other hand, the same data was read from file the buffer entry for that data is incremented. Before replaying any replayable event Xnee makes sure it is in sync. If Xnee is in sync the replaying continues. If Xnee is out of sync it will look for its thresholds and see if it is inside a user specified range. There are three thresholds:

- **positive maximum** nr data read from session file
- **negative minimum** nr of data sent from X server
- **absolute total maximum** sum of the absolute values above

If Xnee read one data from file (e.g the event MapNotify) Xnee checks if the buffer entry for the specific data is bigger than the positive maximum value (after having incremented the buffer value).

If Xnee receives one data from the X server (e.g the event MapNotify) it checks if the buffer entry for the specific data is bigger than the negative minimum value (after having decremented the buffer value).

Xnee also checks if the absolute sum of the differences for every entry in the buffer is higher the a total threshold.

If Xnee is getting out of sync it slows down the speed a bit and tries to continue. However after a while it may happen that Xnee considers that it no use to continue since we are too much out of sync.
Xnee compensates for the delay during replay that is caused when being out of sync.
It is possible to tweak the thresholds using the `--maximum-threshold`, `--negative-threshold` and `--total-diff-threshold` options. Is is also possible to turn off synchronisation completely using the `-ns` option.

9 Xnee Requirements

9.1 Runtime requirements

Xnee requirements:

- RECORD extension
- XTest extension

You can use Xnee in replaying mode without RECORD extension if synchronisation is turned off.

9.2 Development requirements

For development requirements, please look at the DEVELOPMENT file that is distributed with all packages and with CVS.

10 FAQ

'Where do I send questions?'
: xnee-devel@gnu.org

'Where and how do I report bugs?'
: Turn on verbose mode `cnee --verbose` and save the printouts. Include all printouts and log files in the mail which is sent to bug-xnee@gnu.org

'Can you add xxx functionality to Xnee'
: Send an email to xnee-devel@gnu.org and we'll consider it.

'Why the name Xnee?'
: We wanted to use a recursive acronym, as GNU ("GNU's Not Unix'). After having read the Wine documentation, we thought that Xnee is not an Event Emulator would work fine since Xnee is Not an Event Emulator but rather a event recorder and faker.

'What does the name cnee mean?'
: cnee's not an event emulator

'What does the name gnee mean?'
: gnee's not an emulator either

'What does the name pnee mean?'
: pnee's not even emulating

'What doesn't the name gnee mean?'
: gnee's not an Event Emulator

'What license is Xnee released under ?'
: GPL version two or later. Which can be found at http://www.gnu.org/copyleft/gpl.html. Xnee will switch to GPLv3 as soon as GPLv3 is released.

'Where is the CVS repository?'
: You can find a CVS tree at http://savannah.gnu.org. You are more than welcome to join

'Is there a GUI frontend for Xnee ?'
: Yes! Gnee.

'When setting ranges (integers), how do I know what numbers belong'
: to X11 data? You can either type the data name directly (e.g MotionNotify) or you can use the print-xxx-name options.

- `--print-data-name`
- `--print-event-name`
- `--print-error-name`
- `--print-reply-name`
- `--print-request-name`

'When I replay to another display the characters are not correct?'

Make sure you use the same keyboard mapping.
A typical example:

Record local host using Xnee:
`cnee --record --out-file recorded_on_local.xnl`

Store remote keymap:
`xmodmap -pke -display remote:0 > remote.map`

Store local keymap:
`xmodmap -pke > local.map`

Copy local keymap to remote host:
`cat local.map | xmodmap -display remote:0 -`

Replay previously recorded session:
`cnee --replay --file recorded_on_local.xnl --display remote:0`

Copy the original remote keymap to remote host:
`cat remote.map | xmodmap -display remote:0 -`

'When starting Xnee I am informed that I am missing the RECORD extension'

Your X server doesn't have the RECORD extension either loaded or compiled. To solve this you have to, depending on what Xserver you have do the following:

'Can Xnee record more than one display?'

No, we used to consider adding the functionality but have no plans to implement it anymore.

'When starting Xnee I am informed that I am missing the RECORD extension'

Your X server doesn't have the RECORD extension either loaded or compiled. To solve this you have to, depending on what Xserver you have do the following:

- XFree86 4.0 and higher Make sure that the RECORD extension is loaded. This is done by letting the Module section in the X config file (e.g /etc/X11/XF86Config-4) look something like:

```
Section "Module"
   Load "dbe" # Double-buffering
   Load "GLcore" # OpenGL support
   Load "dri" # Direct rendering infrastructure
   Load "glx" # OpenGL X protocol interface
   Load "extmod" # Misc. required extensions
   Load "v4l" # Video4Linux
   # Load "pex5" # PHIGS for X 3D environment (obsolete)
   Load "record" # X event recorder
   # Load "xie" # X Image Extension (obsolete)
```

```
# You only need the following two modules if you do not use xfs.
# Load "freetype" # TrueType font handler
# Load "type1" # Adobe Type 1 font handler
```

EndSection

The important load directive (in this case) is the following line

```
Load "record" # X event recorder
```

- X.org, XFree86 (3.3 and lower) or any other Xserver Recompile and reinstall the Xserver and make sure that RECORD extension is built into the Xserver. Please look at the documentation from your Xserver "vendor" on how to do that.

'How do I build VNC so that I can use Xnee together with it?'

Download vnc source from:
`http://www.uk.research.att.com/vnc/xvnchistory.html`

In the file `Xvnc/config/cf/vnc.def` change NO on the following items to YES as below:

```
#define BuildRECORD YES
#define BuildRECORDlib YES
```

Download the Xfree86 distribution from `http://www.xfree86.org`. Specifically, the following dir, (currently in the file `X430src-3.tgz file`):

```
tar zxvf \
X430src-3.tgz
xc/programs/Xserver/record/
xc/programs/Xserver/record/Imakefile
xc/programs/Xserver/record/record.c
xc/programs/Xserver/record/recordmod.c
xc/programs/Xserver/record/set.c
xc/programs/Xserver/record/set.h
xc/programs/Xserver/record/module/
xc/programs/Xserver/record/module/Imakefile
cp -rf \
xc/programs/Xserver/record \
vnc_unixsrc/Xvnc/programs/Xserver
cd libvncauth/ xmkmf make all
cd Xvnc make World |& tee LOG
```

Verify the build by running `xdpyinfo` in an xterm in the vncserver and verify that RECORD and XTEST extensions are loaded.

'How do I ensure that the mouse, during replay, is at the same position (x,y) as when recorded?'

Use the `--store-mouse-pos` option. This will cause Xnee to store the mouse position before starting to record. This position will be used to set the start position before replaying of recorded data starts.

'`How do I ensure that the same window is focused as when recorded?`'

It's simple, just make sure that you record the window getting focus.

'`The window pops up at different positions when replaying, can Xnee handle that?`'

Yes, use the `--recall-window-position` option when replaying (with cnee). This makes cnee try yo reposition the window as it was positioned when recording the session.

'`Xnee seems to mess up my entire session after replaying a sessions which was interupted by Control-C?`'

Xnee records the KeyPress belonging to Control. After that the system sends Xnee a signal which makes Xnee stop recording. So you end up having a Control KeyPress recorded, with no coresponding KeyRelease. To solve the screwed up session, press Control (which generates a KeyPress and the wanted KeyRelease). If you want to keep your recorded session and not want this to happen again, remove the last line in the recorded file starting with `2,`.

A better way to interrupt Xnee is to use the stop key option, e.g in cnee `--stop-key F1`. This prevents the above situation.

'`Autorepeat is turned off by Xnee, how do I turn it on again?`'

`xset r on`

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