

Linuxfromscratch LFS (lfs)

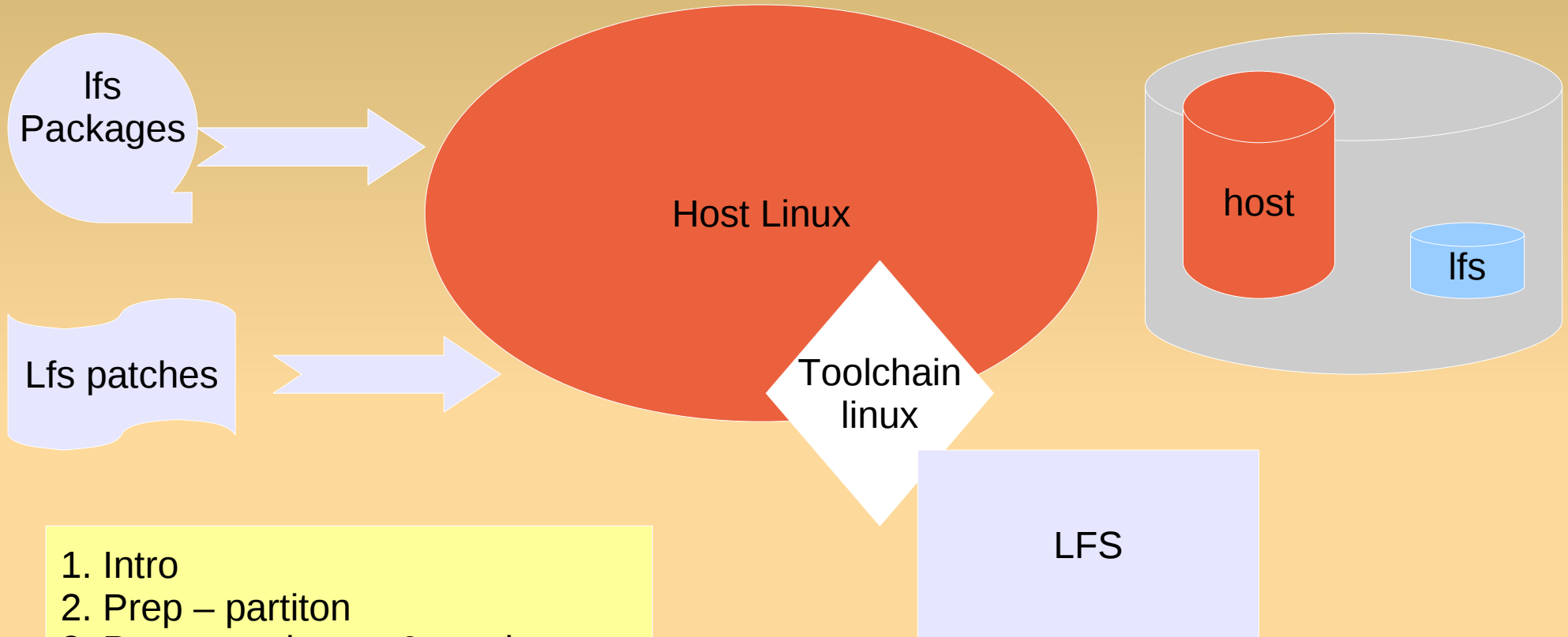
Project lead: Gerald Beekmans
<http://www.linuxfromscratch.org/>
Version 6.3

Copyright© 2009 Robert Hansen
Remodeled Mainframer
Email: rchmath@sbcglobal.net

- From www.linuxfromscratch.org/lfs/
- What is Linux From Scratch?
 - Linux From Scratch (LFS) is a project that provides you with step-by-step instructions for building your own customized Linux system entirely from source.
- Why would I want an LFS system?
 - LFS teaches people how a Linux system works internally
 - Building LFS produces a very compact Linux system
 - LFS is extremely flexible
 - LFS offers you added security

- Some 'noteworthy' urls
- <http://www.linuxfromscratch.org>
- <http://www.linuxfromscratch.org/lfs/>
- <http://www.linuxfromscratch.org/livecd/>
- <http://www.linuxfromscratch.org/faq/>
- search on 'Baking your linux'
- <http://www.linuxfromscratch.org/~matthew/LFS-references.html>
- <http://www.linuxfromscratch.org/hints>

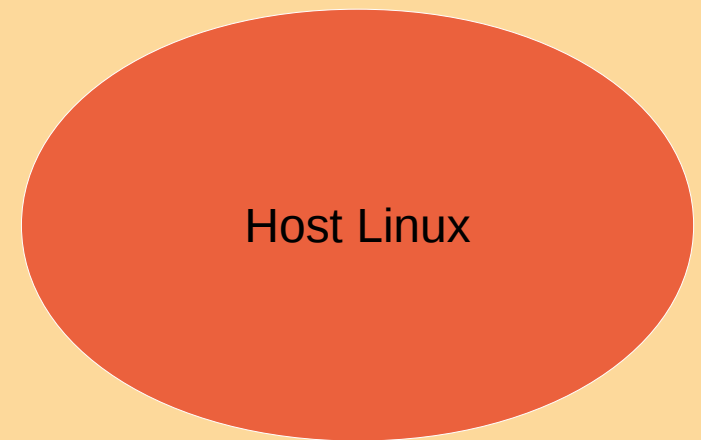
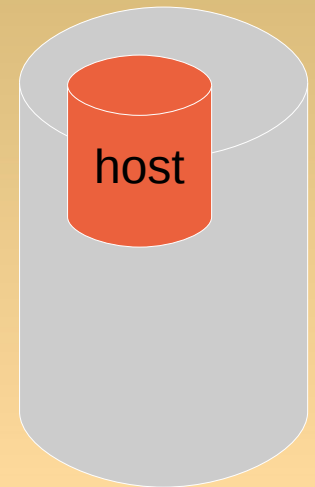
linuxfromscratch



1. Intro
2. Prep – partition
3. Prep – packages & patches
4. \$LFS environment
5. Build tool kit system
6. Build LFS
7. Setting Boot scripts
8. Make bootable

Summary page

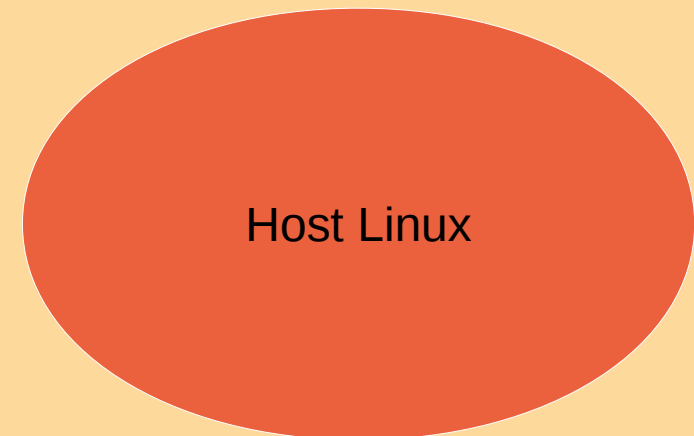
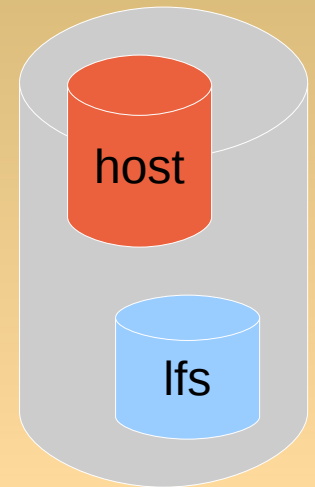
- Determine your background
 - [hints/downloads/files/essential_prereading.txt](#)
- Select your host building system
 - Most current distros will work
 - Consider LFS livecd
- What's new and changed
- Resources (faq, mail lists, irc, references, mirrors, contacts)



linuxfromscratch



- Get some space – a partition
 - Your choice `fdisk`, `cfdisk`, `qparted`
- Create your file system
 - Make ext3 – `mke2fs -vj /dev/<xxx>`
- Mount the `lfs` filesystem
 - Use of `export LFS=/mnt/lfs`
 - Mount `-t ext3 /dev/<xxx> $LFS`
- Set up or use existing swap



LFS partition

linuxfromscratch

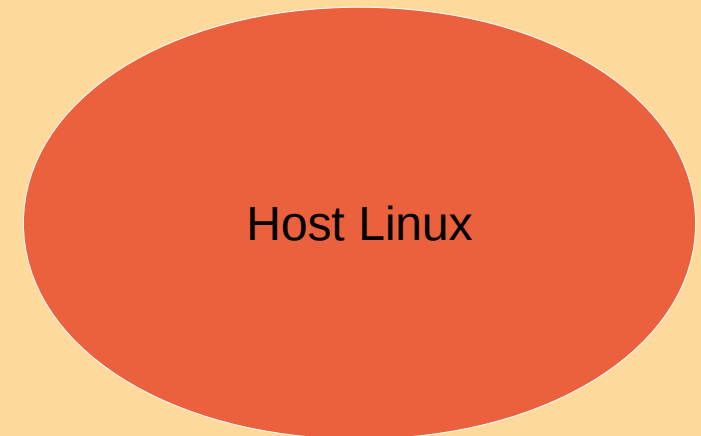
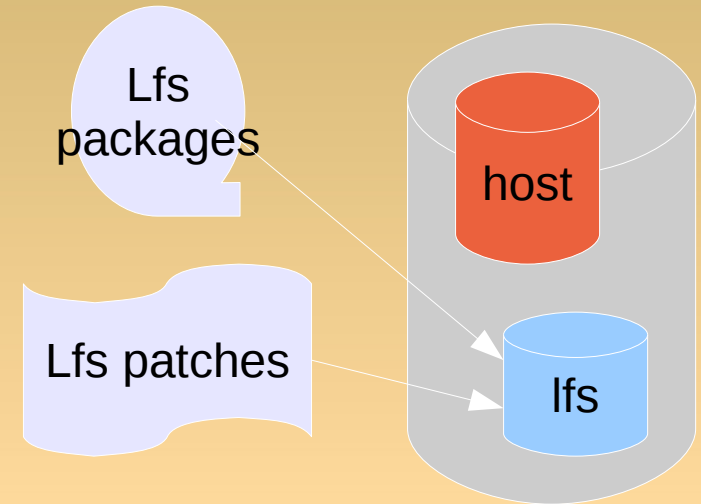


- Packages go in \$LFS/sources

- See The BOOK 3.2
- Hunt them down
- Contained on LFS livecd
- <http://www.linuxfromscratch.org/lfs/packages.html>

- Patches also in \$LFS/sources

- Get from LFS website
- Contained on LFS livecd

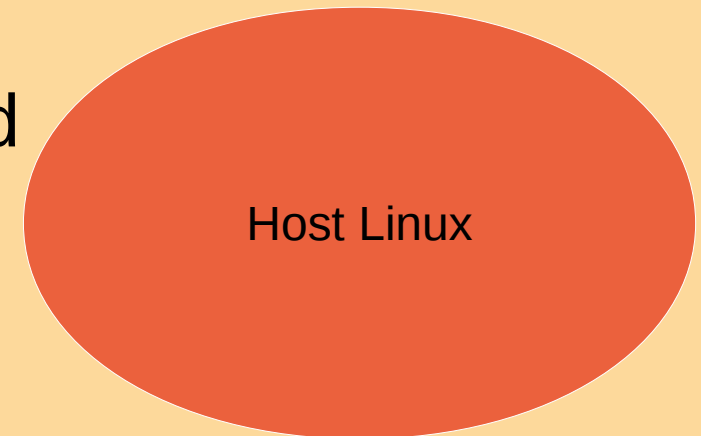
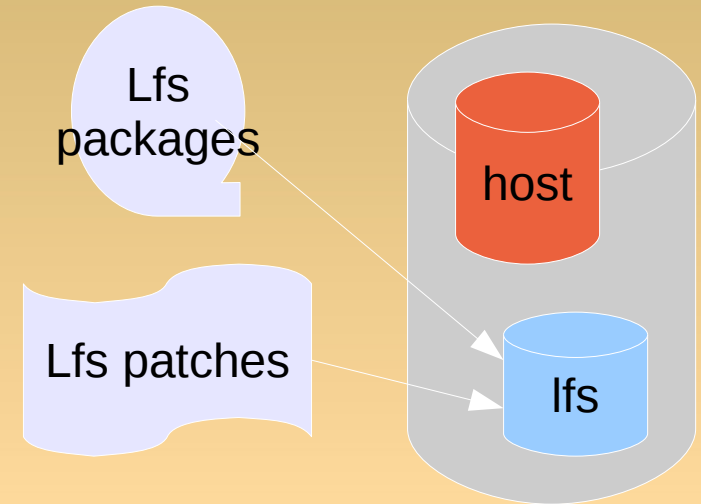


pack/patch

linuxfromscratch

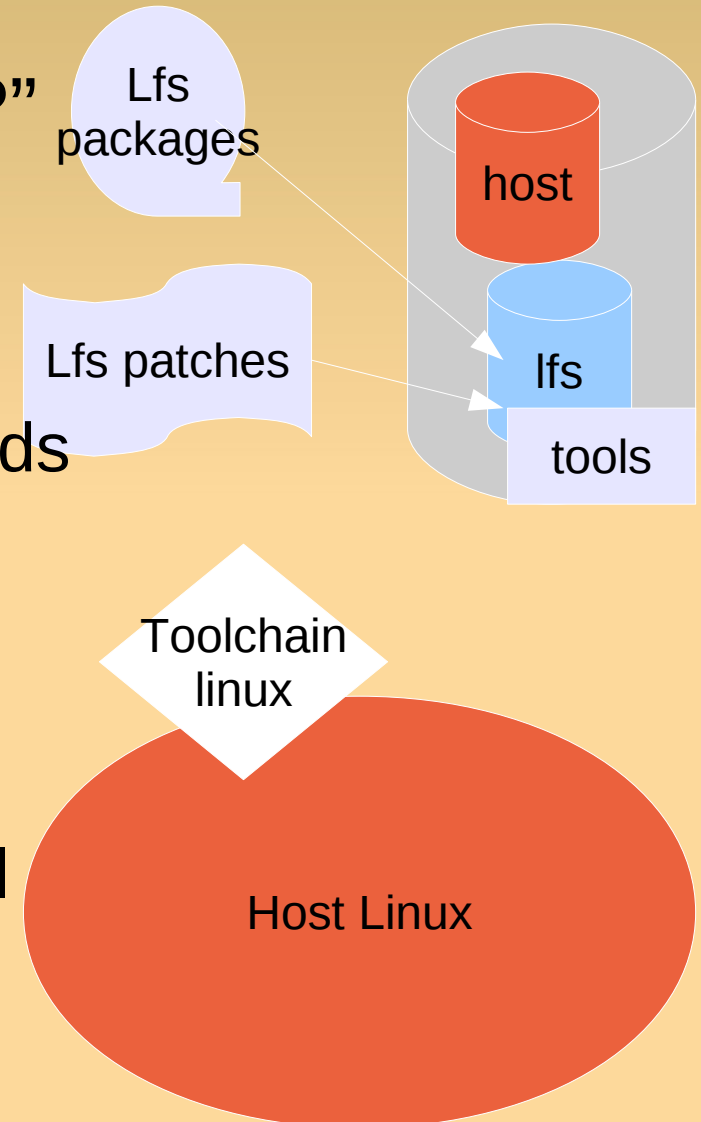


- Final prep for the 'first' build
 - \$LFS (/lfs/mnt) is crucial
 - Create \$LFS/tools dir for work
 - Add the lfs user
 - Set up .bash_profile and .bashrc
- How long will this take ?
 - Measured in SBU (standard build units (length of time for Binutils))
 - <http://www.linuxfromscratch.org/~sbu/>.
- Ready --- Set

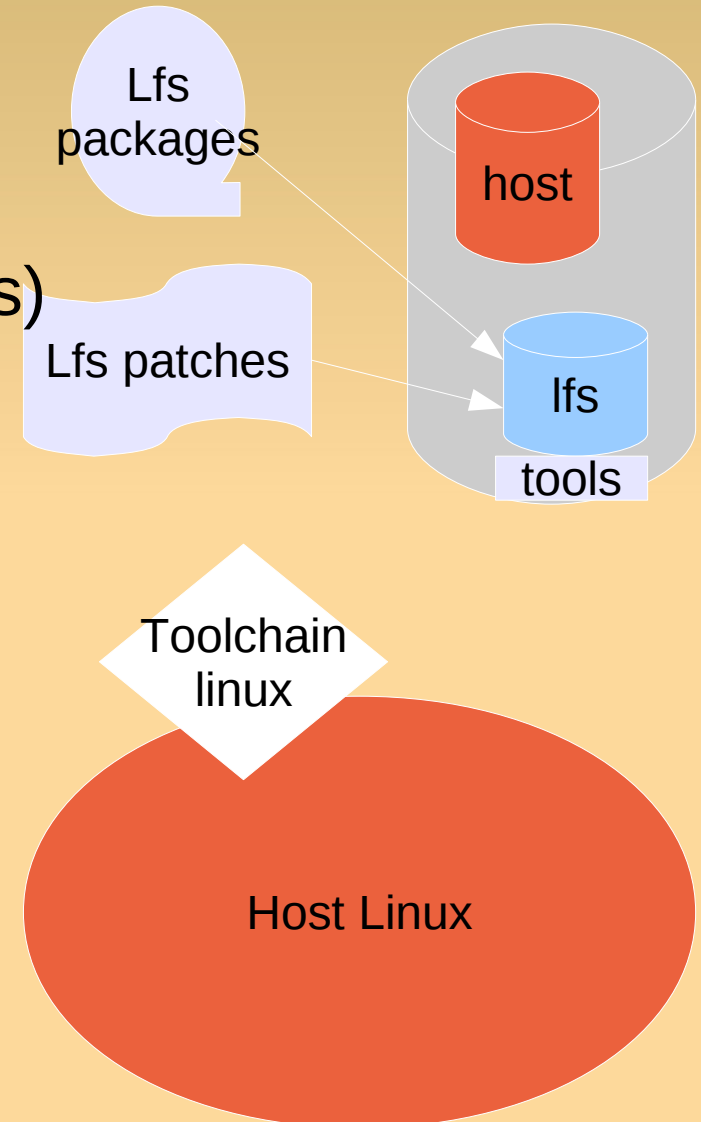


Ready Set

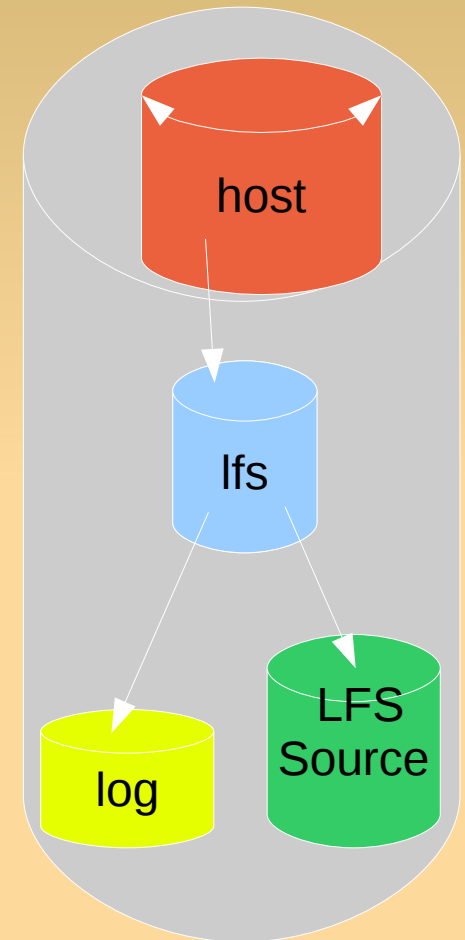
- "Wait - how's this work again?"
 - Pick a package and untar it
 - `./configure make make install`
 - Maybe toss in a few other commands when needed (at the 'right time')
- "So that's all there is ?"
 - Well there's a bit more
 - First package Binutils is an unusual install (sets the SBU)
 - Two of next three GCC Glibc are the two biggest honker (15 SBUs)



- Then you 'fudge' the options on the compiler and linker
- Then smooth sailing (but 15 packages)
- Don't forget to 'delete' packages after building them to prevent conflicts.
- Make sure to be user lfs (mostly)
- Reset the file ownership at end
- Don't let your machine go down ?!
Hint: stages-stop-and-resume



- How to keep track of what I did
- `Cmd 2>&1 | tee outfile`
 - Carve out space for cmd output
 - Put at `/mnt/lfs/logfile`
 - Exec `logdir` to place the outfile
 - Exec `rch` wrapper for command saving the command, its output and anything else you want.
 - Put `logdir` and `rch` to be available



linuxfromscratch



Directory structure for logging

```
/ ---- root
/mnt
/lfs
  /lfs-source
    pkg1.tar
    pkg2.tar
    /pkg1      result of untarring pkg1.tar
    /pkg2      ....
                ... and so on
  /log
    /pkg1      generated by logdir (files within actions of rch cmd)
    /pkg2      .....
                ... and so on correspondingly
```

```
/      root
/home
  /userid
    /samplsys
      /source
      /log
```

linuxfromscratch



```
112009.odp - OpenOffice.org | Terminal - rchansen@rch904x: ~/samplesys
File Edit View Terminal Go Help

samplesys $ logdir
bash: /home/rchansen/bin/logdir: Permission denied
samplesys $ . logdir
The current lead directory is -->
enter the new leaddir var (or null to retain)
:> /home/rchansen/samplesys/log
/ ~/samplesys
/home/rchansen/samplesys/log is NOT a directory.

Should I create the directory y/n ?.y
mkdir: created directory `/home/rchansen/samplesys/log'
~/samplesys
The current work directory is
enter the new workdir var (or null to retain) :> palindrome
the lead directory is /home/rchansen/samplesys/log
the work directory is palindrome
~/samplesys/log ~/samplesys
palindrome is NOT a directory.

Should I create the directory y/n ? :> y
mkdir: created directory `palindrome'
~/samplesys
total dir is /home/rchansen/samplesys/log/palindrome
samplesys $
```

Use of logdir cmd

linuxfromscratch



```
112009.odp - OpenOffice.org Terminal - rchansen@rch904x: ~/samplesys/source
File Edit View Terminal Go Help
samplesys $ ls
log source
samplesys $ cd source
source $ ls -a
. .. palindrome.tar
source $ rch tar -xvf palindrome.tar
enter file name for data :> untarit

tar -xvf palindrome.tar 2>&1 | tee /home/rchansen/samplesys/log/palindrome/untarit

Should the above command be executed ? y/n :> y
..y
xxx
Please enter a comment about this command.
: > expand the package
./palindrome/
./palindrome/reverse.h
./palindrome/configure
./palindrome/palin.c
./palindrome/palin.h
./palindrome/reverse.c
./palindrome/Makefile
./palindrome/palindrome.c
source $
```

Cmd wrapper use

linuxfromscratch



```
Open Image - Op Terminal - rchansen@rch904x: ~/samplesys/source/palindrome
File Edit View Terminal Go Help
palindrome $ pwd
/home/rchansen/samplesys/source/palindrome
palindrome $ ls
configure palin.c      palindrome.c palin.h  reverse.c  reverse.o
Makefile  palindrome  palindrome.o palin.o  reverse.h
palindrome $ ls ../../log
overall_command_history  palindrome
palindrome $ ls ../../log/palindrome
config make make_install package_command_history untarit
palindrome $ head ../../log/palindrome/package_command_history -n 5
Thu Dec 10 10:51:48 CST 2009
The comment: expand the package
The command: tar -xvf palindrome.tar
Command issued from : /home/rchansen/samplesys/source
Output is saved in : /home/rchansen/samplesys/log/palindrome/untarit
palindrome $ grep command: ../../log/palindrome/package_command_history
The command: tar -xvf palindrome.tar
The command: ./configure
The command: make
The command: make install
palindrome $
```

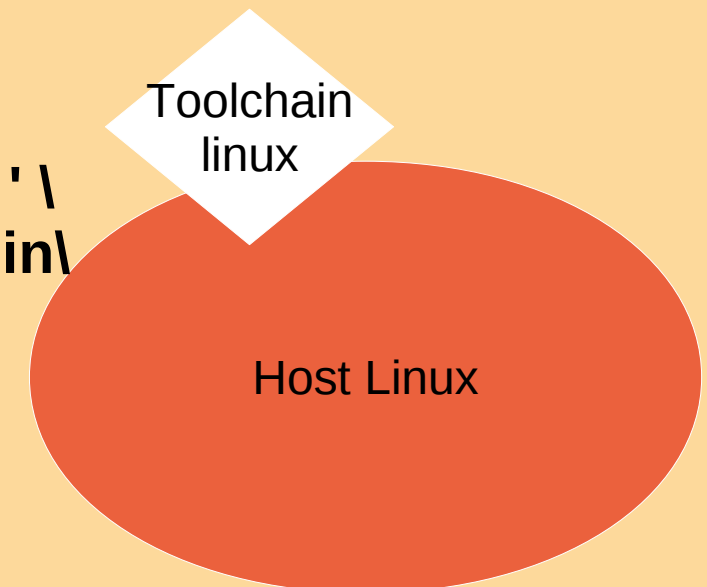
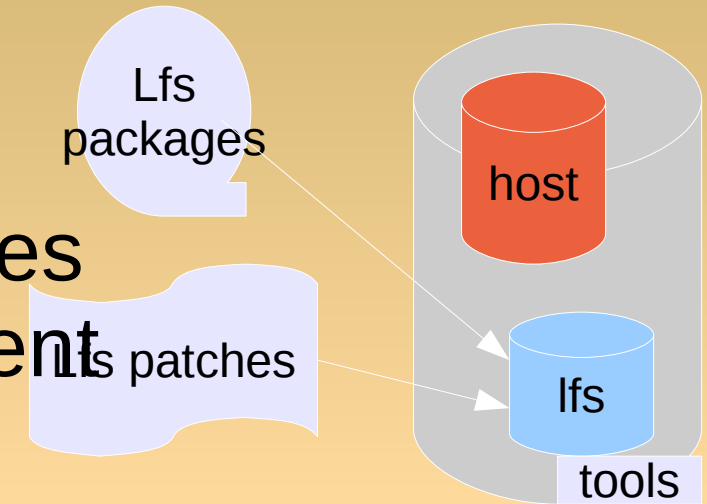
- List of toolkit Linux packages
- | | |
|----------------------------|------------------|
| Binutils-2.17 Pass 1 | GCC-4.1.2 pass1 |
| Linux-2.6.22.5 API Headers | Glibc-2.5.1 |
| Tcl-8.4.15 | Expect-5.43.0 |
| DejaGNU-1.4.4 | GCC-4.1.2 Pass 2 |
| Binutils-2.17 Pass 2 | Ncurses-5.6 |
| Bash-3.2 | Bzip2-1.0.4 |
| Coreutils-6.9 | Diffutils-2.8.1 |
| Findutils-4.2.31 | Gawk-3.1.5 |
| Gettext-0.16.1 | Grep-2.5.1a |
| Gzip-1.3.12 | Make-3.81 |
| Patch-2.5.4 | Perl-5.8.8 |
| Sed-4.1.5 | Tar-1.18 |
| Texinfo-4.9 | Util-linux-2.12r |

Begin full build (50+ packages)

- Define virtual filesystems/devices and discuss package management
- Enter the chroot environment

```
chroot "$LFS" /tools/bin/env -i \  
HOME=/root TERM="$TERM" PS1='\u:\w\$ ' \  
PATH=/bin:/usr/bin:/sbin:/usr/sbin:/tools/bin \  
/tools/bin/bash --login +h
```

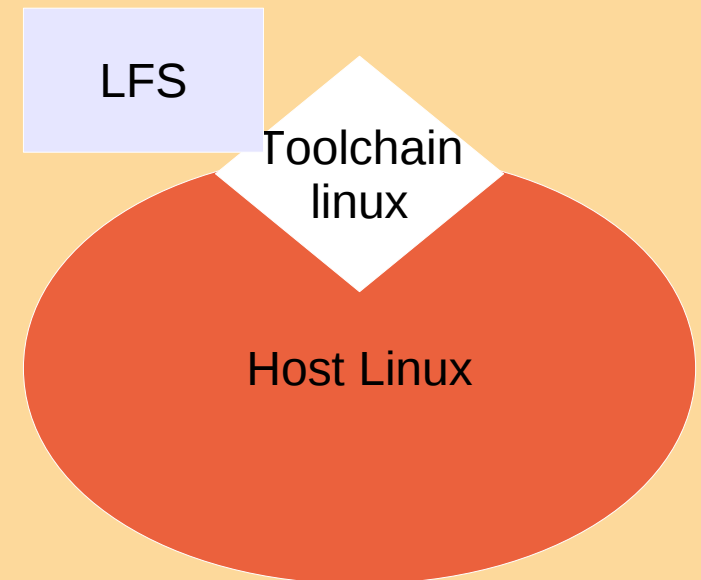
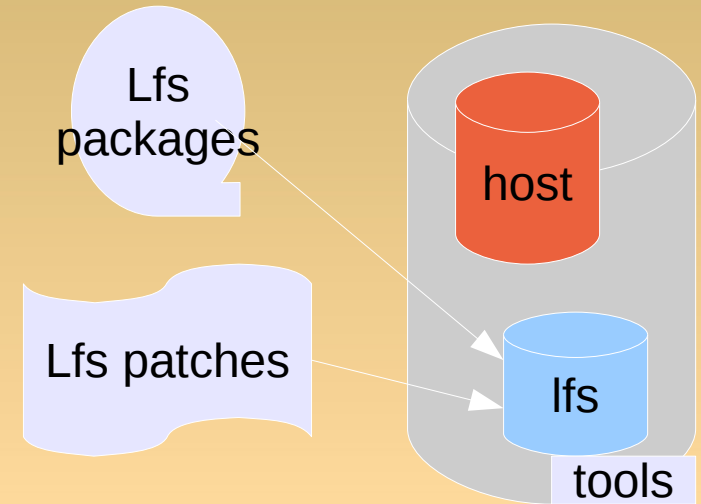
- Set up standard file directories symlinks and fakouts



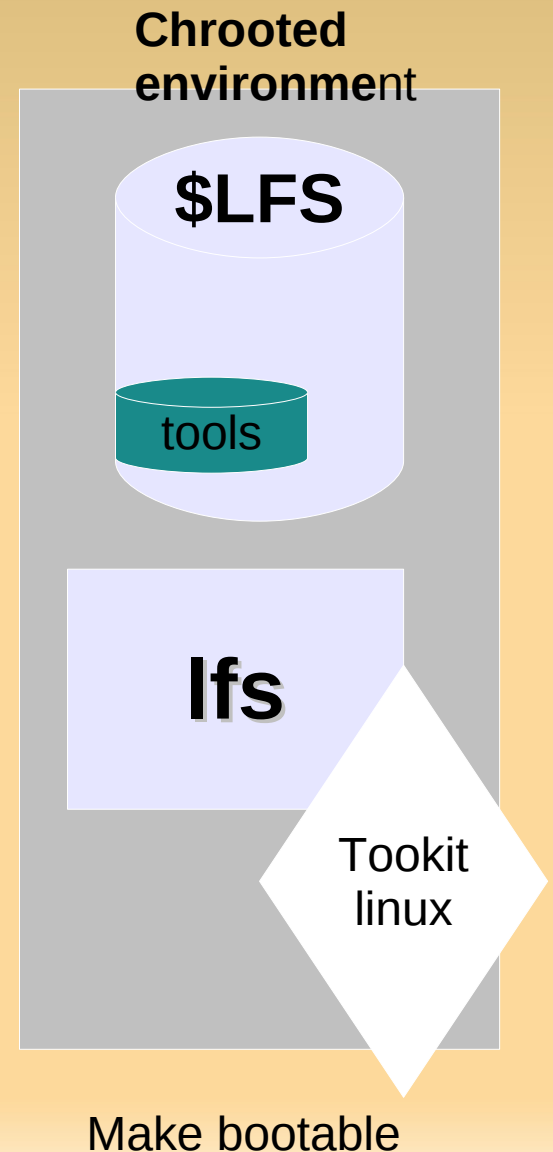
linuxfromscratch



- Start with Glibc, "mess with the toolchain", Binutils, GCC
- Crank 'em out – lots of `untar` `config` `make` `make install` ..
- Just seems to go on and on there are special commands and important program lists



- Obtain and read about bootscripts
 - device (udev) and console setup
 - clock and syslogd
 - Inputrc and bash shell startups
 - Hostname, hosts, static ip, resolv
- Make System Bootable
 - Update the fstab
 - Linux-2.6.22.5
 - grub-ify (install grub or add to current)



- And now what ? Boot, play, be frustrated at what you don't have.
- Back it up – there is `lfsbackup.txt` hint
- Consider BLFS (Beyond LFS)
- I added lynx (browser, 'The Book' reader and most of the 'mc' things I use.)
- Other goodies
 - `Lfs-livecd`
 - A 'buildt' lfs system

- Contents of the 'built' lfs CD
 - Howto 'install' prebuilt LFS 6.3 (readme)
 - Prebuilt tarball (lfs.6.3.tar.gz)
 - Sources and book for lfs 6.3
 - This presentation (openoffice and pdf formats)
 - Checksum file (md5check)
 - History and regen information (gendate)
 - Bonus info in built system EXTRAs directory