Linuxfromscratch LFS (lfs)

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http://www.linuxfromscratch.org/
Version 6.3

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- 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

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- 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

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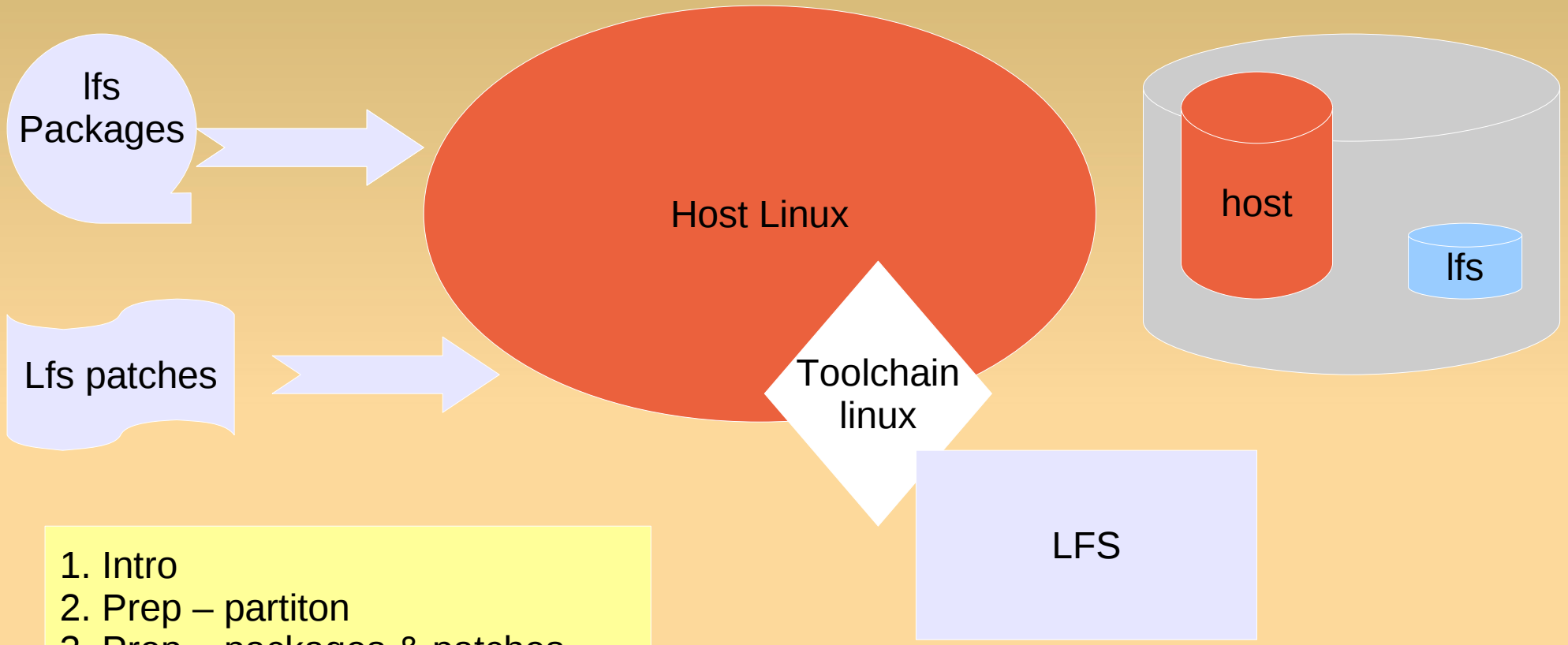

1. Intro
2. Prep – partiton
3. Prep – packages & patches
4. $LFS environment
5. Build tool kit system
6. Build LFS
7. Setting Boot scripts
8. Make bootable

Summary page

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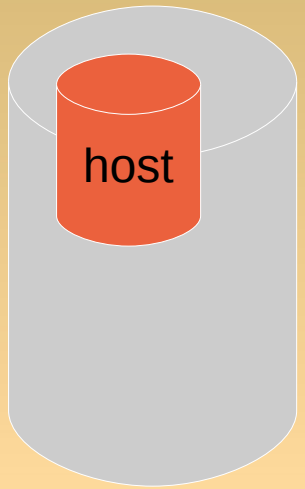
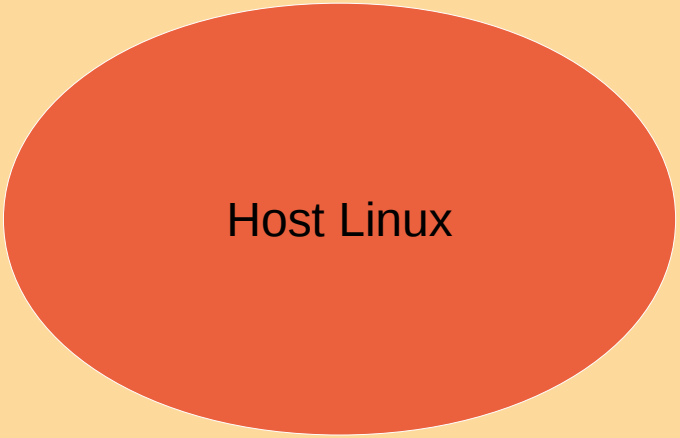
- Determine your background
  - hints/downloads/files/essential_prereading.txt
- Select you host building system
  - Most current distros will work
  - Consider LFS livecd
- What's new and changed
- Resources (faq, mail lists, irc, references, mirrors, contacts)





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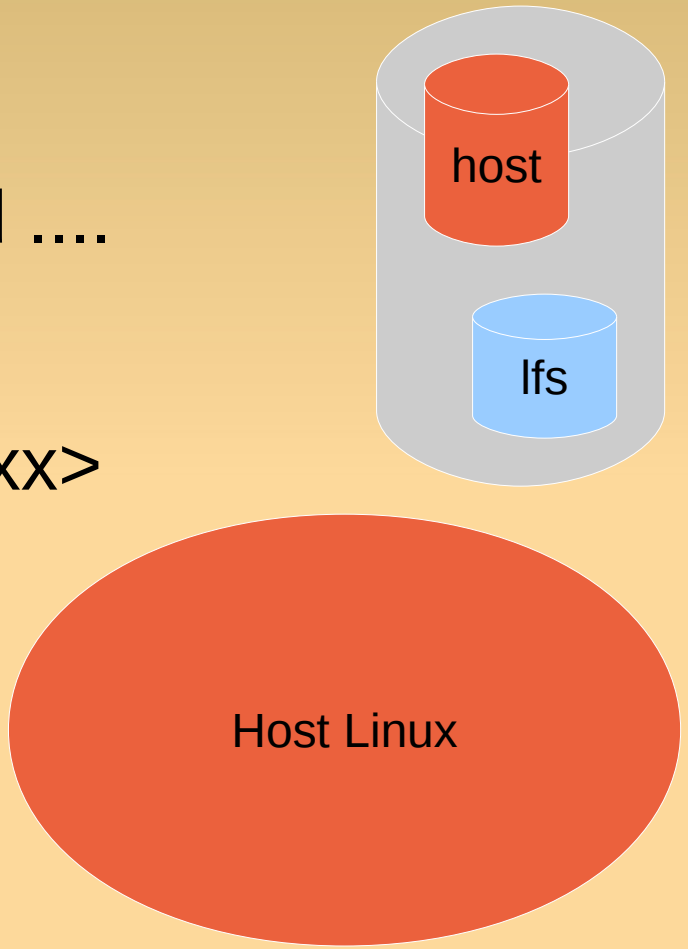
- Get some space – a partition
  - Your choice fdisk, cfdisk, qparted ....
- Create your file system
  - Make ext3 – mke2fs -vj /dev/<xxx>
- Mount the lfs filesystem
  - Use of export LFS=/mnt/lfs
  - Mount -t ext3 /dev/<xxx> $LFS
- Set up or use existing swap



LFS partition

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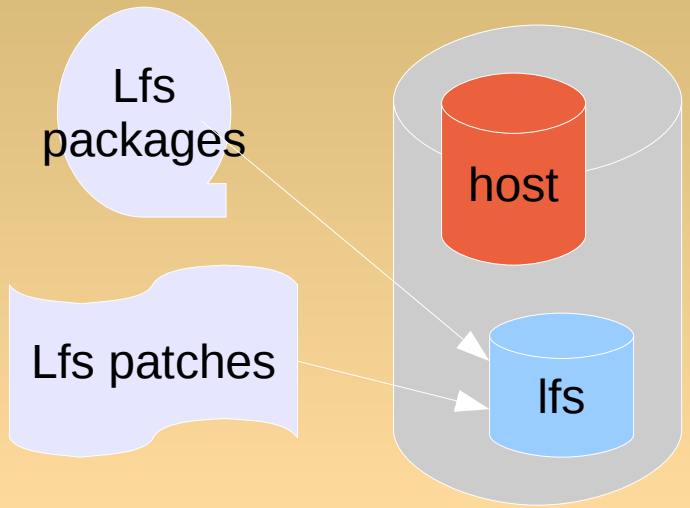
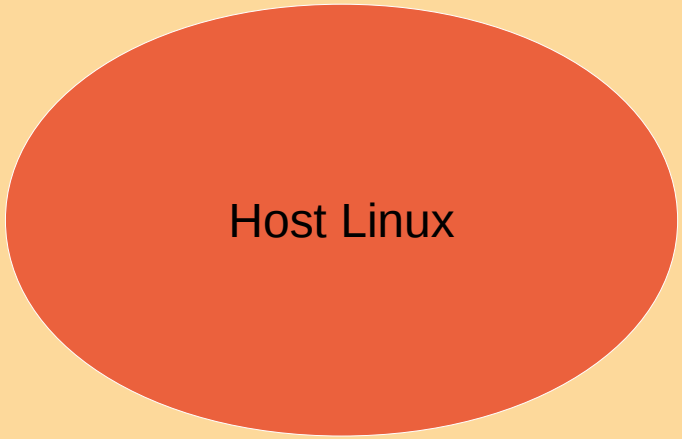
- Packages go in $LFS/sources
  - See The BOOK 3.2
  - Hunt them down
  - Contained on LFS livecd
  - http://www.linuxfromscratch.org/lfs/packages.html
- Patches also in $LFS/sources
  - Get from LFS website
  - Contained on LFS livecd





pack/patch

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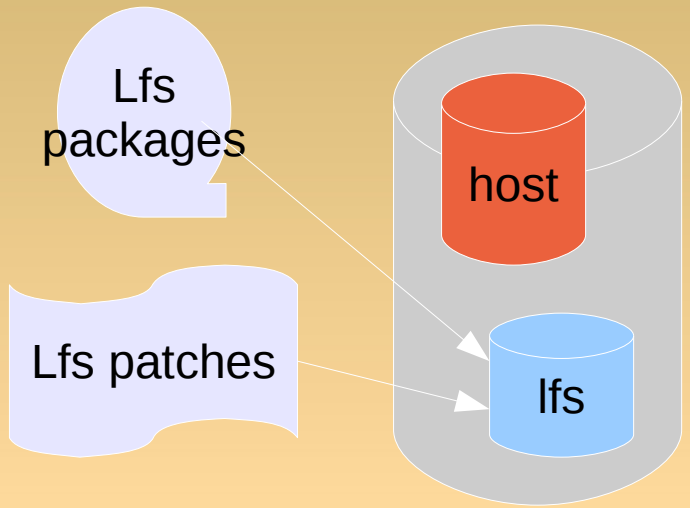
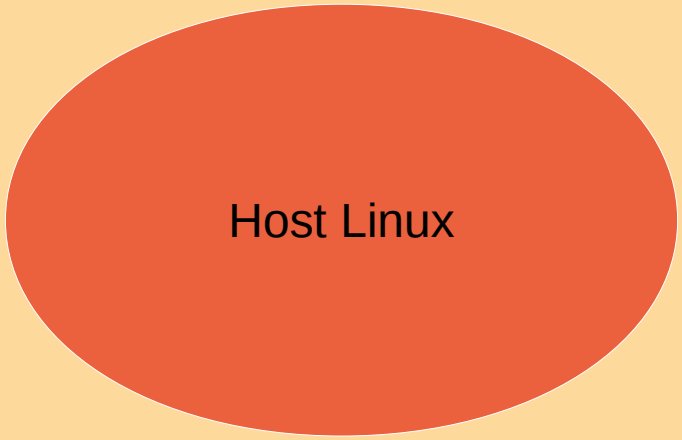
- Final prep for the 'first' build
  - $LFS (/lfs/mnt) is crucial
  - Create $LFS/tools dir for work
  - Add the lfs user
  - Set up .bash_profile and .bashrc
- How long will this take ?
  - Measured in SBU (standard build units (lenght of time for Binutils)
  - http://www.linuxfromscratch.org/~sbu/.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





Ready Set

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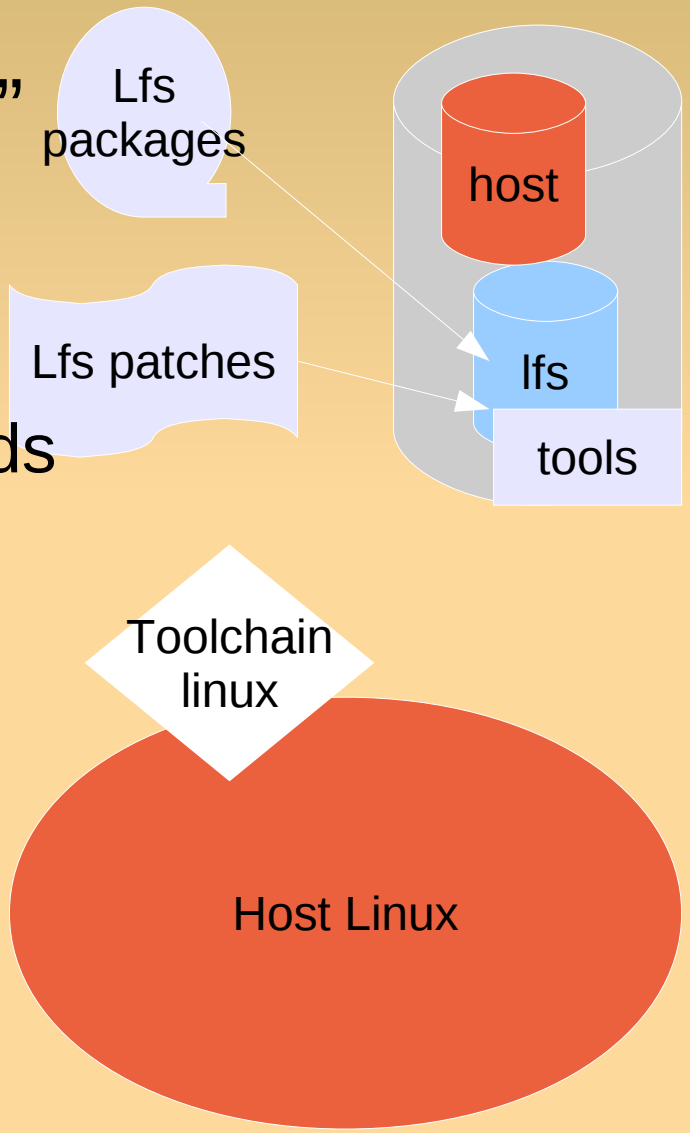
- ”Wait - how'es this work again?”
  - Pick a package and untar it
  - ./configure make make install
  - Maybe toss in a few other commands when needed (at the 'right time')
- ”So that's all there is ?”
  - Well there's a bit more
  - First package Binutils is an unusual install (sets the SBU)
  - Two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



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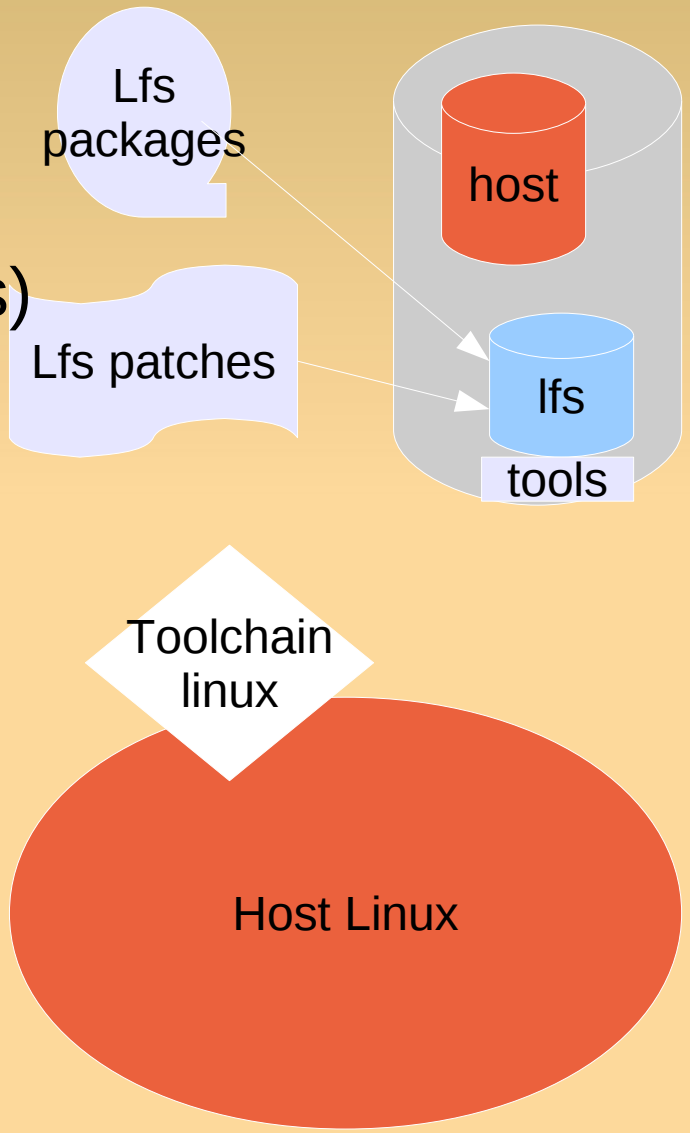
- Then you 'fudge' the options on the compiler and linker
- Then smooth sailing (but 15 packages)
- Don't forget to 'delete' packages after building them to prevent conflicts.
- Make sure to be user lfs (mostly)
- Reset the file ownership at end
- Don't let your machine go down ?!
  Hint: stages-stop-and-resume



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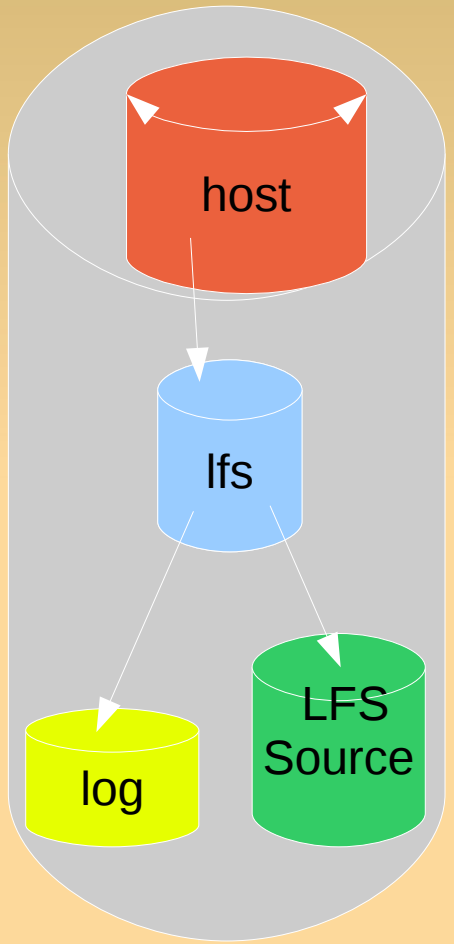
- How to keep track of what I did
- Cmd 2>&1 | tee outfile
  - Carve out space for cmd output
  - Put at /mnt/lfs/logfile
  - Exec logdir to place the outfile
  - Exec rch wrapper for command saving the command, its output and anything else you want.
  - Put logdir and rch to be available



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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
```

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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

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```
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/unta
rit

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

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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 $
```

Log info overview

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

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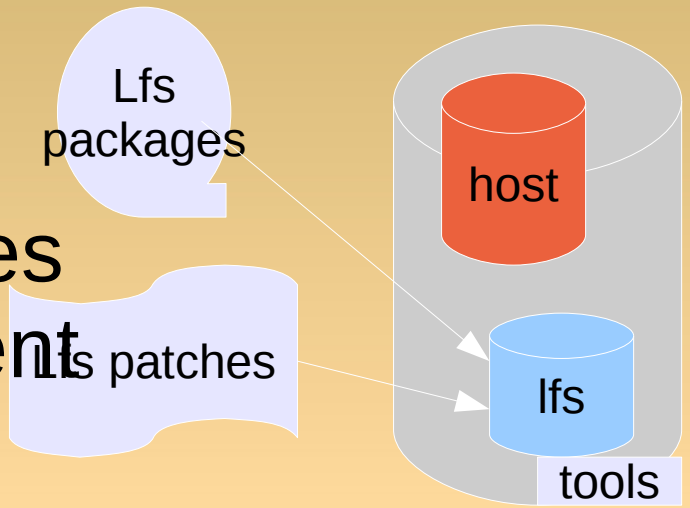
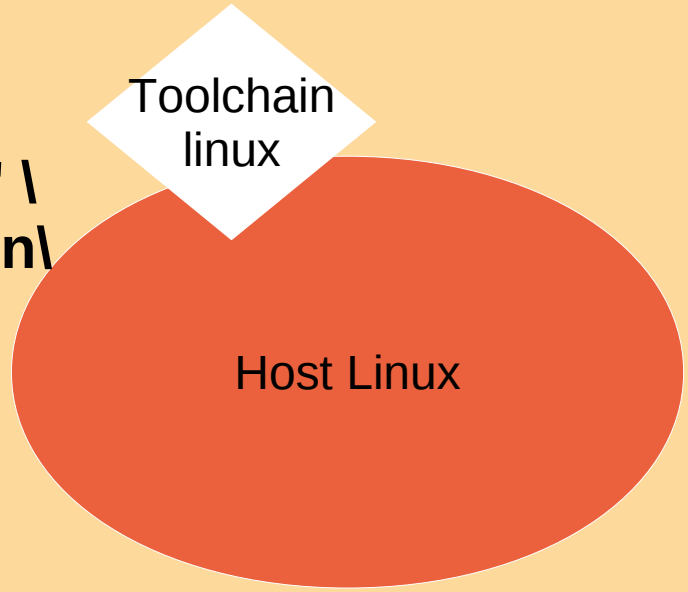
Begin full build (50+ packages)

- Define virtual filesystems/devices and discuss package managment
- 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



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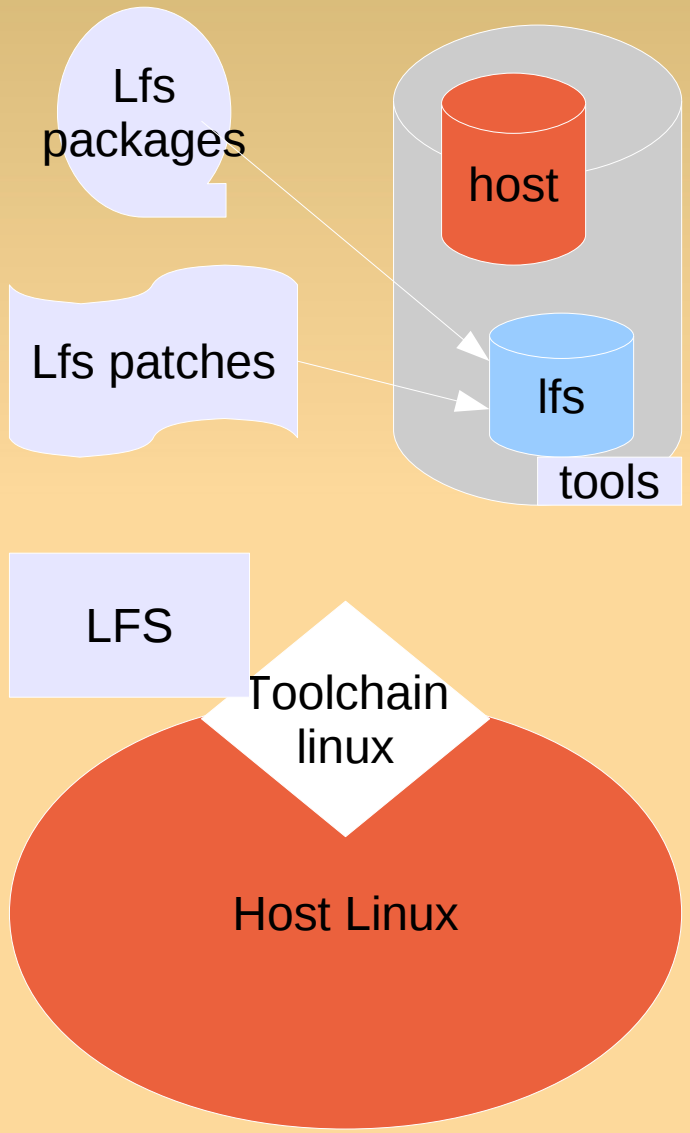
- Start with Glibc, ”mess with the toolchain” , Binutils, GCC
- Crank 'em out – lots of untar config make make install ..
- Just seems to go on and on there are special commands comment and important program lists



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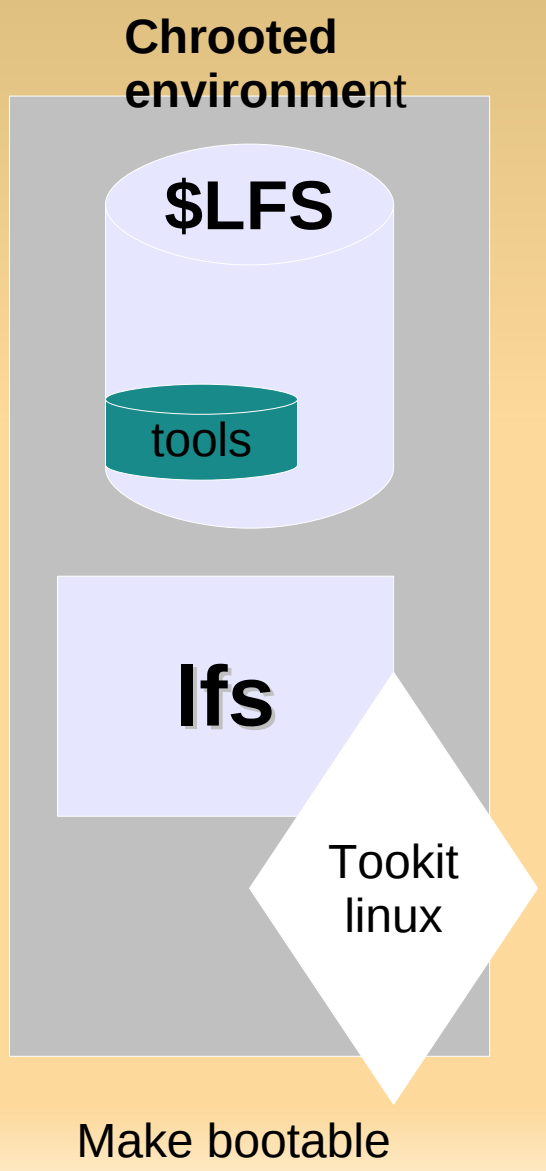
- Obtain and read about bootscripts
  - device (udev) and console setup
  - clock and syslogd
  - Inputrc and bash shell startups
  - Hostname, hosts, static ip, resolv
- Make System Bootable
  - Update the fstab
  - Linux-2.6.22.5
  - grub-ify (install grub or add to current)



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- 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

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- 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