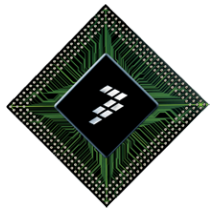
Linux Target Image Builder

Version1.2

July 2008

Roll your own Linux®, the easy way

LTIB Birds Of a Feather session



Stuart Hughes

Software Engineer

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What is LTIB

- A tool to develop Linux® board support packages (BSPs)
- A tool to publish BSPs that are known to boot and run
- A tool to re-configure and rebuild published BSPs
  - You can create your own based on existing ones
  - You can re-publish (make your own ISO images)
- A tool to make all this (relatively) easy

What LTIB is not

- An SCM system
  - Although some have been known to abuse it this way
- A Linux® distribution
  - Some seem to think it is
- An application development environment
  - Although it is useful if you need to add operating system components

Why do we need another target builder?

- Many fine projects, but no single project has all the required features:
  - Debian: Won't scale small enough
  - ELDK: Not easy to build from source
  - Buildroot: No package management, uClibc focus
  - OpenEmbedded: Too complex, scratchbox not available on all architectures
  - uClinux-dist: Monolithic download, no package management

Philosophy

- Open source (GPL)
- No proprietary internal data formats
  - Uses kernel LKC for configuration, standard rpm spec files
- Simple command-line tool
  - Text based so it's usable over low bandwidth links
  - Can be driven by scripts and batched
- Common userspace package payload across all architectures
- All packages can be built from source (non-root user)

Philosophy (cont)

- Packages cross compiled with known good binary toolchains
  - Sources available via srpms on GPP
- Content is kept separately from the build system
  - Provided by packages pools (e.g. GPP)
- Target C library parts taken from the toolchain by default
- Don't gratuitously upgrade (bloat and spaghetti)
- Making a new target type should be easy
  - The simplest could be just two text files

Features

- Runs on most popular Linux® distros (rpm or deb based)
- Supports multiple architectures (Power Architecture®, ARM®, Coldfire®)
  - Can add new types if you have a cross toolchain and kernel
- Curses based configuration of kernel/packages/sysconfig/image
- Over 250 packages
- Auto package dependency resolution

Features (cont)

- Auto-conflict overlay (scaling)
- Auto-package dependency re-build/install trigger
  - e.g. coreutils removal will re-install busybox
- Can use your own custom toolchain or kernel
- Support for kernel/u-boot builds from directory or git trees

Features (cont)

- The kernel and busybox drop to their own config screens if required
- Support for uClibc or glibc
- Support for whole target image pre-configured node set (preconfigs)
- Support for pre-configured package sets (profiles)
- Interface headers/libraries/rpm database private per instance
- Spec files/cross compiling kept simple using 'spoofing'

Features (cont)

- Single package mode using prep/scbuild/scdeploy
  - Modified sources are never automatically deleted
- Modified package sources can be captured using 'patchmerge'
  - The corresponding spec file is also auto-updated with the new patch
- Semi-automated srpm import mode
- Shell mode to run at the command line in an LTIB environment
- NFS, RAMDISK and JFFS2 output supported

Features (cont)

- Incremental deploy to NFS root filesystem area
- Auto-builder support (--batch, --continue)
- Can list all available packages including details of licenses
- Release mode creates an ISO image including LTIB and packages

Basic Use

- Getting LTIB:
  - $ cvs -z3 -d:pserver:anonymous@cvs.savannah.nongnu.org:/sources/ltib co ltib
- Installing and buiding for the first time:
  - $ ./ltib
- Re-configuring:
  - $ ./ltib -m config
- Re-building:
  - $ ./ltib

Installing for the first time

$ cvs -z3 -d:pserver:anonymous@cvs.savannah.nongnu.org:/sources/ltib co ltib

....

U ltib/doc/index

U ltib/doc/wiki_style.css

$ cd ltib

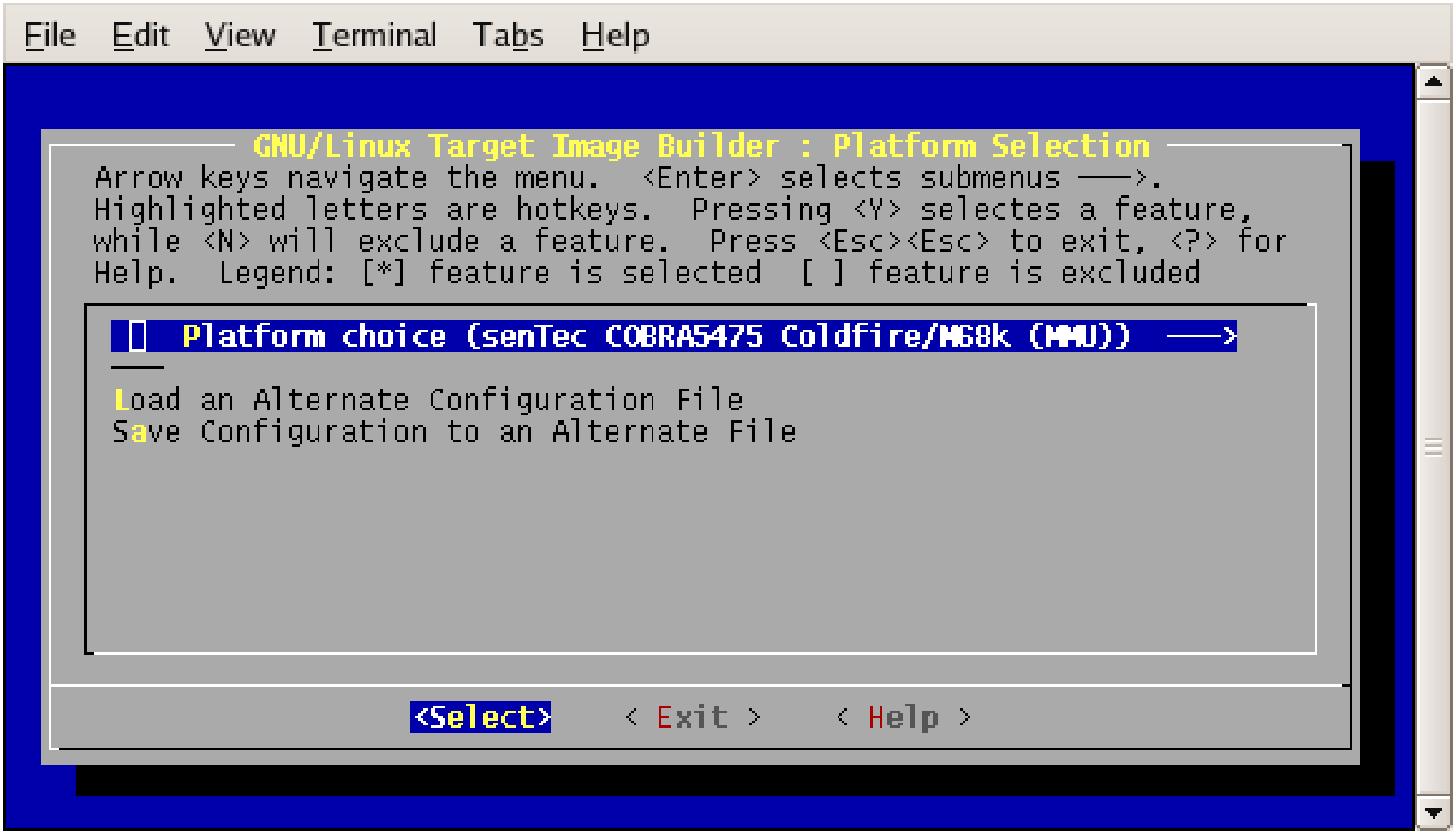
$ ./ltib

Installing host support packages.

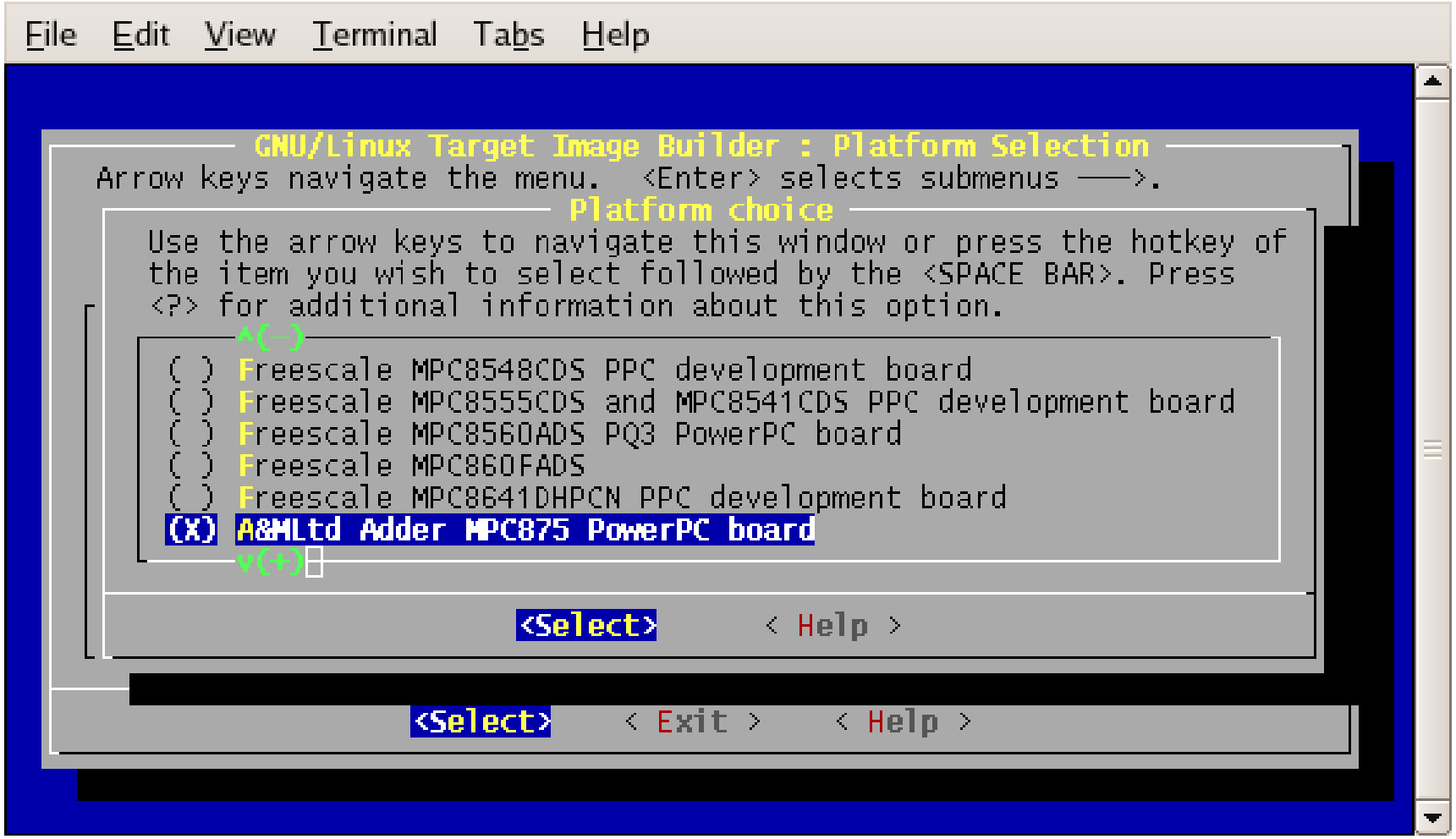
This only needs to be done once per host, but may take up to an hour to complete ...

If an error occurs, a log file with the full output may be found in: /home/seh/ltib/host_config.log

Initial configuration screen



Selecting the target platform



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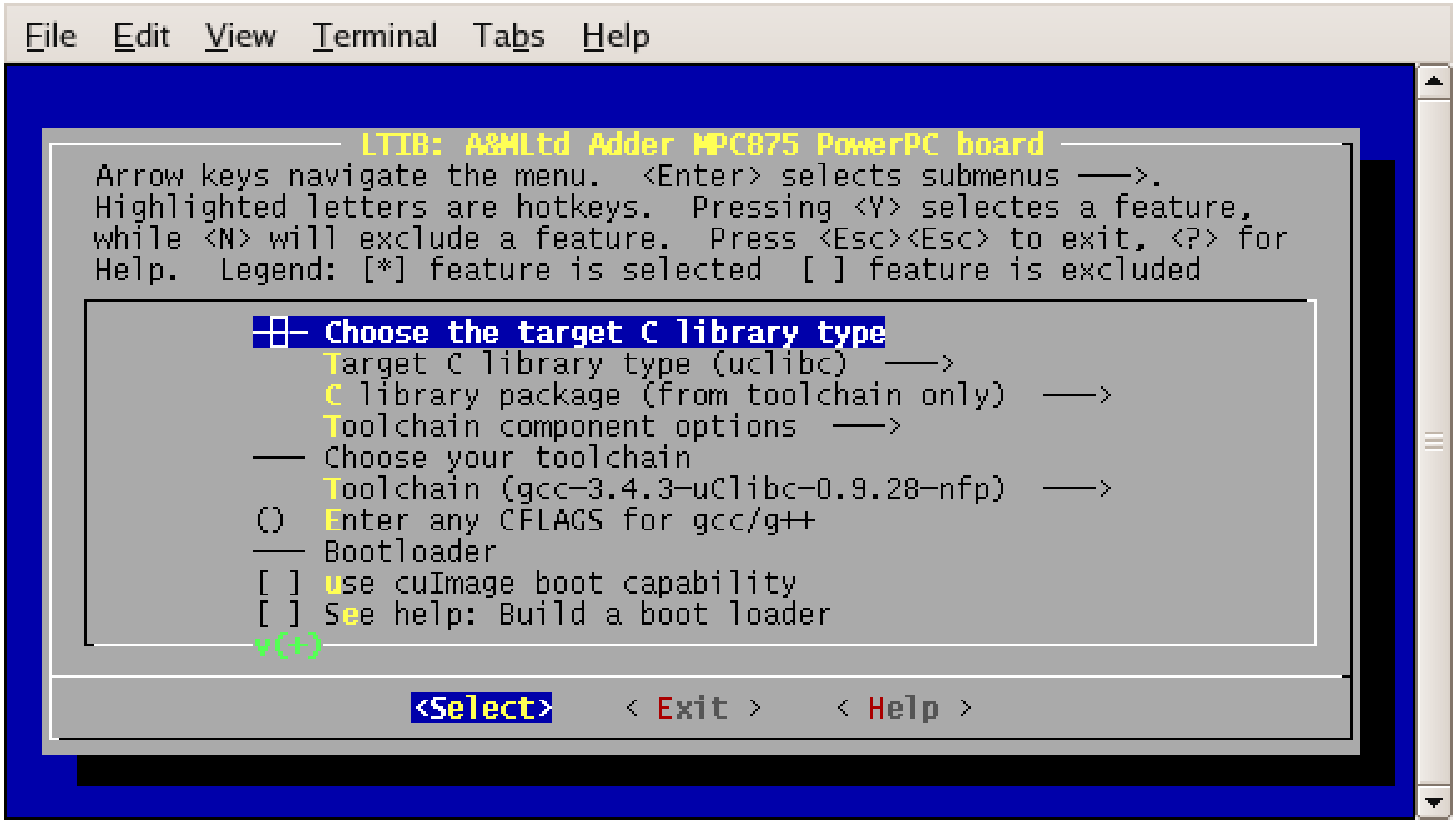
Platform configuration screen



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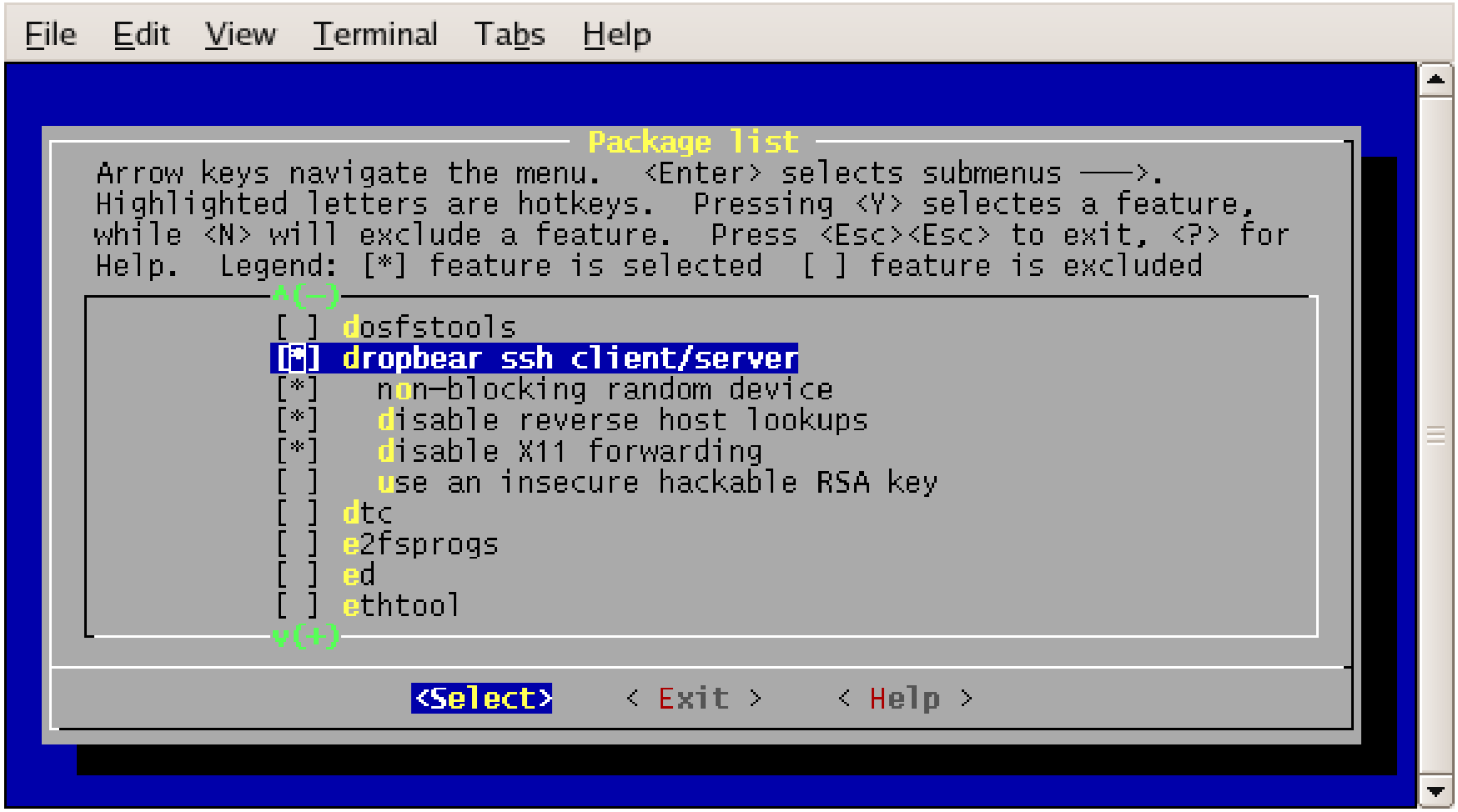
Package selection



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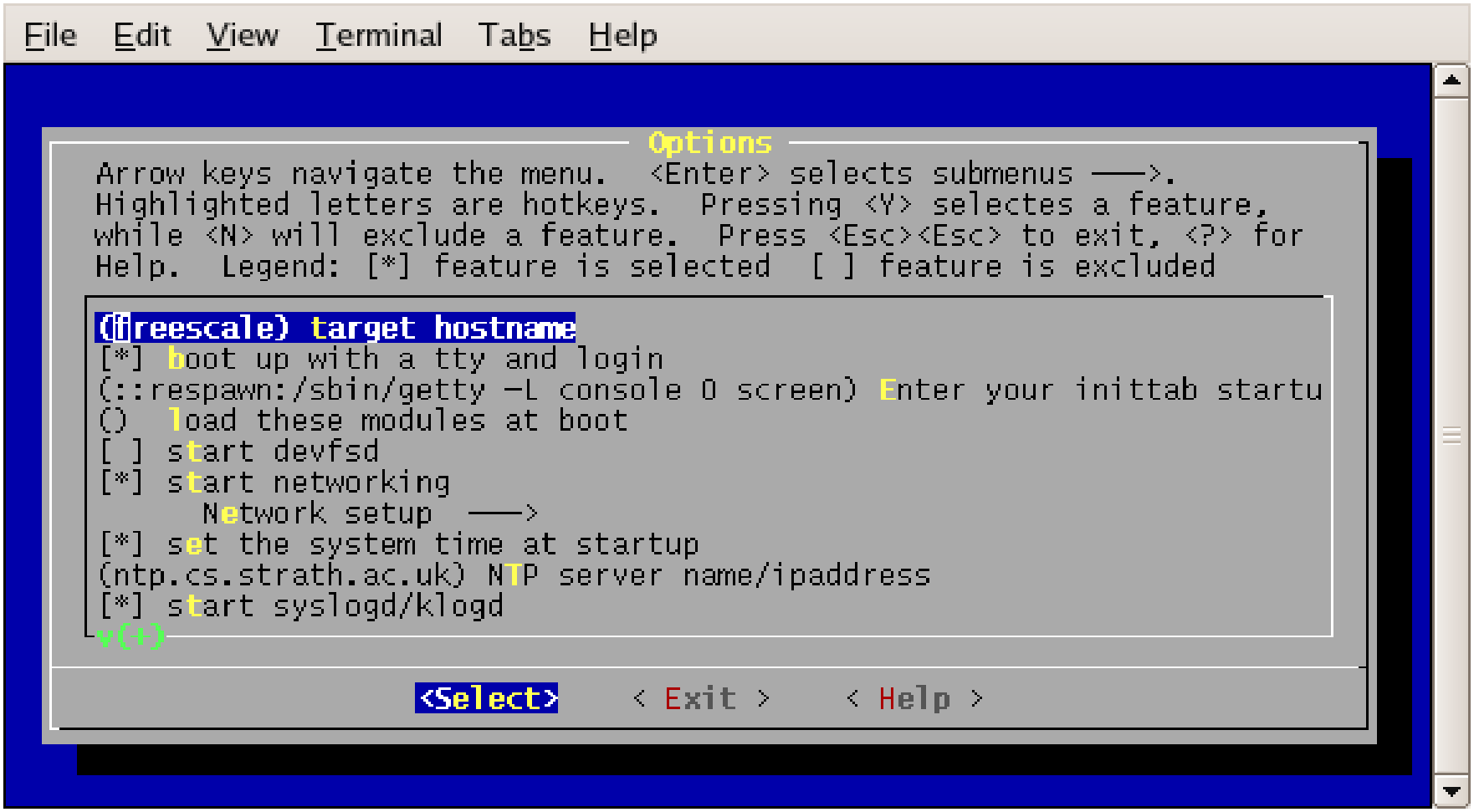
System configuration



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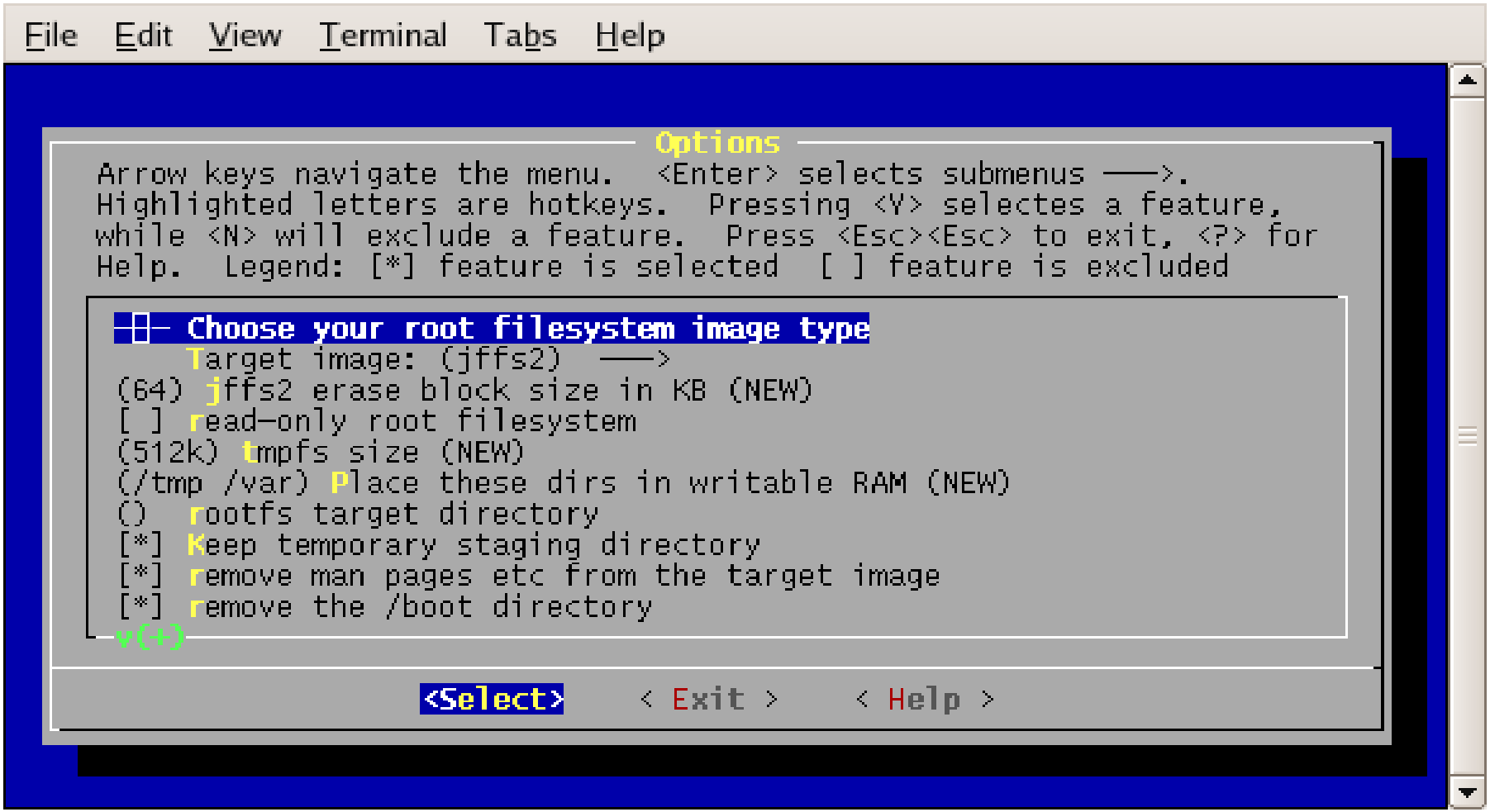
Target image options



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LTIB now builds the configuration chosen

Installing: tc-fsl-x86lnx-ppc-uclibc-nfp-3.4.3-1.i386.rpm

sudo /opt/ltib/usr/bin/rpm --dbpath /opt/ltib/var/lib/rpm -ivh --force --ignorearch /opt/freescale/pkgs/tc-fsl-x86lnx-ppc-uclibc-nfp-3.4.3-1.i386.rpm

Preparing... ### [100%]

1:tc-fsl-x86lnx-ppc-uclib### [100%]

Processing platform: A&MLtd Adder MPC875 PowerPC board

==========

using config/platform/qs875s/.config

Processing: fake-provides

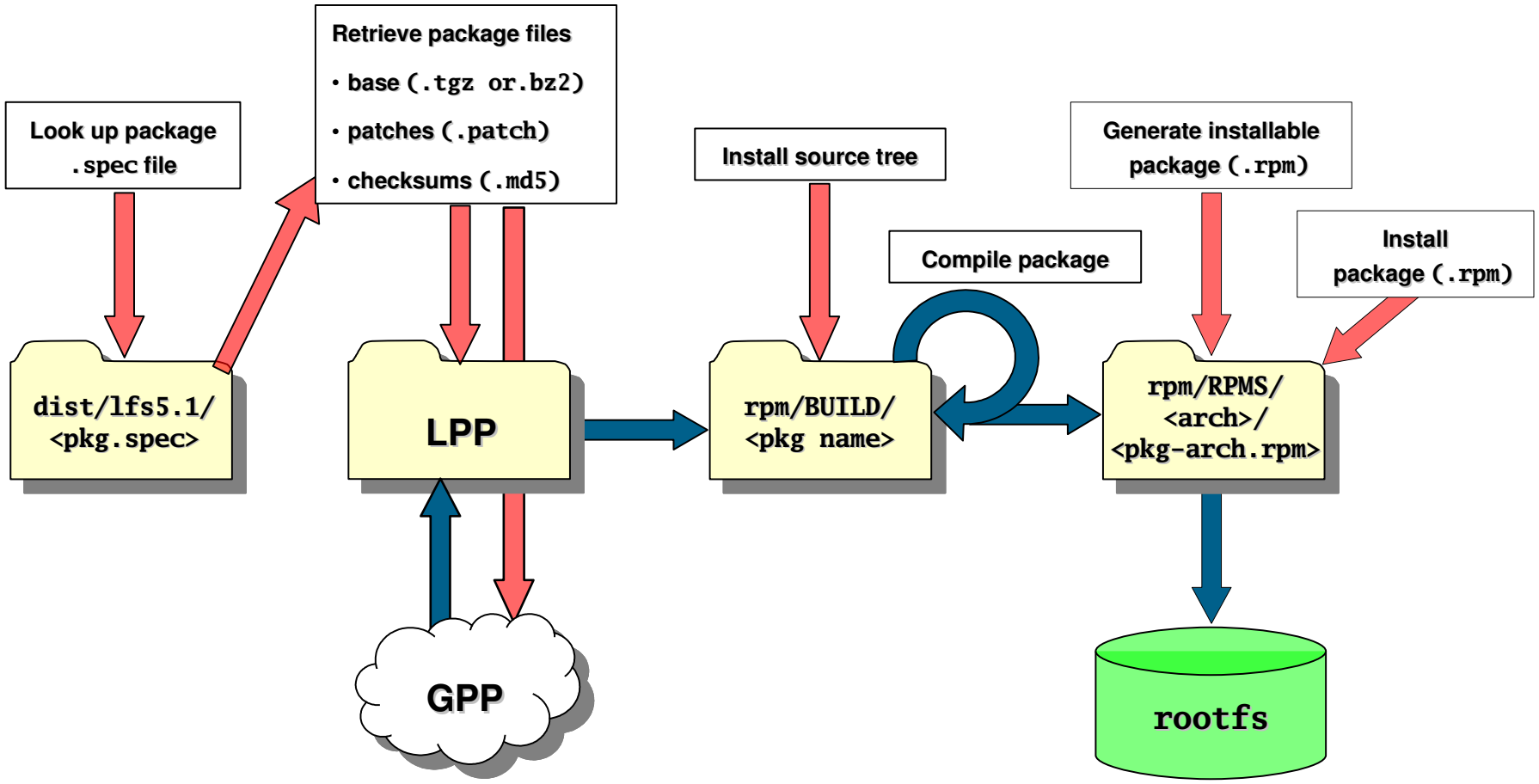
==========

rpmbuild --dbpath /home/seh/ltib/rootfs//var/lib/rpm --target ppc --define '_unpackaged_files_terminate_build 0' --define '_target_cpu ppc' --define '__strip strip' --define '_topdir /home/seh/ltib/rpm' --define '_prefix /usr' --define '_tmppath /home/seh/ltib/tmp' --define '_mandir /usr/share/man' --define '_sysconfdir /etc' --define '_localstatedir /var' -bb --clean --rmsource /home/seh/ltib/dist/lfs-5.1/fake-provides/fake-provides.spec

How it works

- Platform is selected from a list of directories in config/platform/*
- Platform is optionally re-configured using mconf
  - Configuration saved in config/platform/{target}/.config
- ltib script reads configuration points to extract the package build list
- Build list is ordered by config/userspace/pkg_map
- Each package is built in order using a corresponding rpm spec file
- When all built, optionally a RAMDISK or JFFS2 image is built

How it works – building and installing a package



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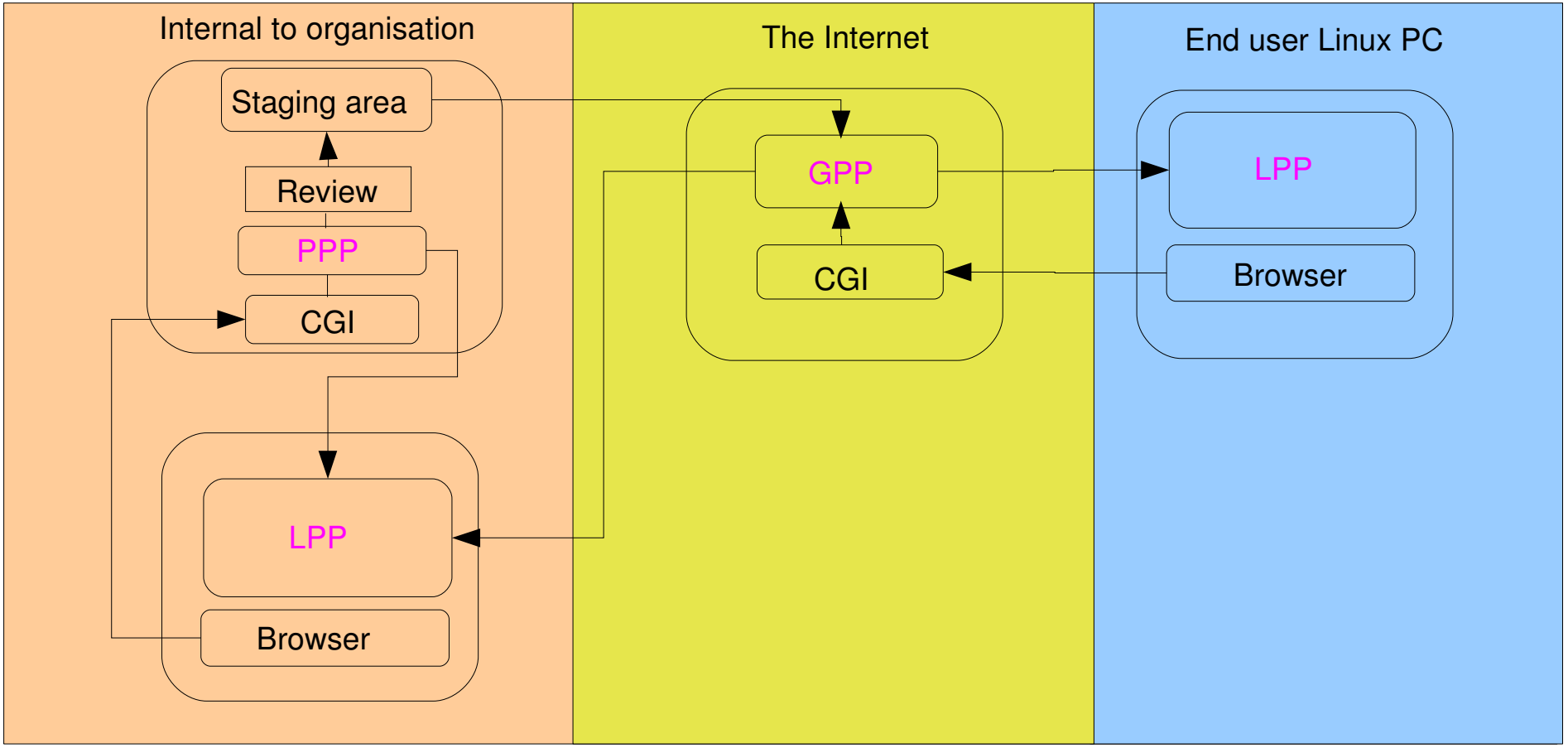
How it works - spoofing

- Should not be needed, but some packages are not well behaved
- When ltib is building, gcc is an alias for the cross compiler
- Your per-project interface area is wired for you by spoofing
  - You don't need to say: -I -L <rootfs>/usr/{include,lib}
- rpath-link is use to resolve indirect library dependencies
- The LTIB host support package pkg-config uses the <rootfs> prefix
- TOOLCHAIN_CFLAGS from ltib are always guaranteed to be injected

LTIB package pools

PPP/GPP/LPP data-flow



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More advanced command line options

- Modes:
  - Single package: -m prep/scbuild/scbuild/scinstall/scdeploy/patchmerge
  - Erase packages: -m clean
  - Start again: -m distclean
  - List packages: -m listpkgs
  - Make an ISO: -m release
  - Configure only: -m config
  - Shell mode: -m shell

More advanced command line options (cont)

- Options:
  - One package only: --pkg <pkg>
  - Configure and build: --configure
  - Whole configuration: --preconfig <filename>
  - Use these packages: --profile <filename>
  - Batch mode: --batch
  - Disable dependency: --nodeps
  - Conflict check on: --conflicts
  - Create srpms: --keepsrpms
  - Verbose output: --verbose
  - Dry run: --dry-run
  - Continue on error: --continue

More advanced command line options (cont)

- Options (cont):
  - Output version: --version
  - Download only: --dlonly
  - Download test: --dltest
  - Leave built sources: --leavesrc
  - Host packages: --hostcf
  - Help screen: --help

Resources

- LTIB home page:
  - http://www.bitshrine.org/
- LTIB project, including CVS (hosted by Savannah)
  - http://savannah.nongnu.org/projects/ltib
- LTIB mailing list (hosted by Savannah)
  - http://lists.nongnu.org/mailman/listinfo/ltib
- Freescale BSP ISO releases (free to download and use)
  - http://www.freescale.com/webapp/sps/site/overview.jsp?code=CW_BSP&srch=1

Demo and Questions

Demo

- Time/hardware permitting

Questions?

- Ask me now
- Send email to: stuarth at freescale dot com

Thank you for attending!


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