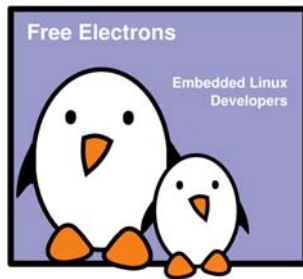# 08-1 BusyBox

Chapters 9 and 10

- 9: File Systems
  - Partitions
  - ext2, ext3, ext4
  - ReiserFS
  - JFF2
  - NFS
  - /proc, /sys
- 10: Memory Technology Devices (MTD) Subsystem
  - Supports memory-like devices such as Flash
  - Device driver layer that provides an API for raw flash devices
  - Neither *block* nor *char*

Embedded Linux system development

BusyBox

Thomas Petazzoni
Michael Opdenacker
Free Electrons

General purpose toolbox: BusyBox

http://www.busybox.net/

- Most Unix command line utilities within a single executable! It even includes a web server!

- Sizes less than < 500 KB (statically compiled with uClibc) or less than 1 MB (statically compiled with glibc)

- Easy to configure which features to include

- The best choice for

  - Initramfs / initrd with complex scripts

  - Small and medium size embedded systems

See http://www-128.ibm.com/developerworks/linux/library/l-busybox/ for a nice introduction

BusyBox was first written by Bruce Perens in 1996

BusyBox commands!

[, [[, addgroup, adduser, adjtimex, ar, arp, arping, ash, awk, basename, bbconfig, bbsh, brctl, bunzip2, busybox, bzcat, bzip2, cal, cat, catv, chat, chattr, chcon, chgrp, chmod, chown, chpasswd, chpst, chroot, chrt, chvt, cksum, clear, cmp, comm, cp, cpio, crond, crontab, cryptpw, cttyhack, cut, date, dc, dd, deallocvt, delgroup, deluser, depmod, devfsd, df, dhcprelay, diff, dirname, dmesg, dnsd, dos2unix, dpkg, dpkg_deb, du, dumpkmap, dumpleases, e2fsck, echo, ed, egrep, eject, env, envdir, envuidgid, ether_wake, expand, expr, fakeidentd, false, fbset, fbsplash, fdflush, fdformat, fdisk, fetchmail, fgrep, find, findfs, fold, free, freeramdisk, fsck, fsck_minix, ftpget, ftpput, fuser, getenforce, getopt, getsebool, getty, grep, gunzip, gzip, halt, hd, hdparm, head, hexdump, hostid, hostname, httpd, hush, hwclock, id, ifconfig, ifdown, ifenslave, ifup, inetd, init, inotifyd, insmod, install, ip, ipaddr, ipcalc, ipcrm, ipcs, iplink, iproute, iprule, iptunnel, kbd_mode, kill, killall, killall5, klogd, lash, last, length, less, linux32, linux64, linuxrc, ln, load_policy, loadfont, loadkmap, logger, login, logname, logread, losetup, lpd, lpq, lpr, ls, lsattr, lsmod, lzmacat, makedevs, man, matchpathcon, md5sum, mdev, mesg, microcom, mkdir, mke2fs, mkfifo, mkfs_minix, mknod, mkswap, mktemp, modprobe, more, mount, mountpoint, msh, mt, mv, nameif, nc, netstat, nice, nmeter, nohup, nslookup, od, openvt, parse, passwd, patch, pgrep, pidof, ping, ping6, pipe_progress, pivot_root, pkill, poweroff, printenv, printf, ps, pscan, pwd, raidautorun, rdate, rdev, readahead, readlink, readprofile, realpath, reboot, renice, reset, resize, restorecon, rm, rmdir, rmmod, route, rpm, rpm2cpio, rtcwake, run_parts, runcon, runlevel, runsv, runsvdir, rx, script, sed, selinuxenabled, sendmail, seq, sestatus, setarch, setconsole, setenforce, setfiles, setfont, setkeycodes, setlogcons, setsebool, setsid, setuidgid, sh, sha1sum, showkey, slattach, sleep, softlimit, sort, split, start_stop_daemon, stat, strings, stty, su, sulogin, sum, sv, svlogd, swapoff, swapon, switch_root, sync, sysctl, syslogd, tac, tail, tar, taskset, tcpsvd, tee, telnet, telnetd, test, tftp, tftpd, time, top, touch, tr, traceroute, true, tty, ttysize, tune2fs, udhcpc, udhcpd, udpsvd, umount, uname, uncompress, unexpand, uniq, unix2dos, unlzma, unzip, uptime, usleep, uudecode, uuencode, vconfig, vi, vlock, watch, watchdog, wc, wget, which, who, whoami, xargs, yes, zcat, zcip

Commands available in BusyBox 1.13 (v1.18.5 in bitbake)

Applet highlight - BusyBox vi

- If you are using BusyBox, adding vi supports only adds 20K. (built with shared libraries, using uClibc)

- You can select which exact features to compile in

- Users hardly realize that they are using a lightweight vi version!

- Tip: you can learn vi on the desktop, by running the vimtutor command

Configuring BusyBox
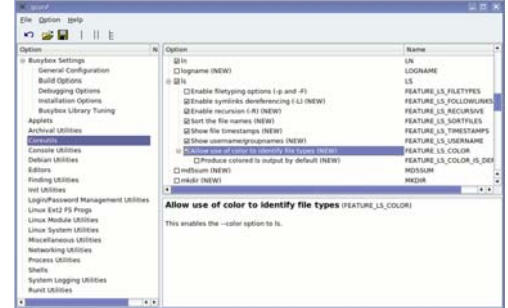
- Get the latest stable sources from http://busybox.net

- Configure BusyBox (creates a .config file):

- make defconfig
  Good to begin with BusyBox
  Configures BusyBox with all options for regular users

- make allnoconfig
  Unselects all options. Good to configure only what you need

- make xconfig (graphical) or make menuconfig (text)
  Same configuration interfaces as the ones used by the Linux kernel

BusyBox make xconfig

You can choose:

- the commands to compile,

- and even the command options and features that you need!

Compiling BusyBox

- See http://elinux.org/EBC_Exercise_17_Configuring_BusyBox

Alternative to BusyBox: embutils

http://www.fefe.de/embutils/
From the creator of diet libc

- A similar set of tiny utilities for embedded systems. Version 0.19 (Aug. 2008): 90 common commands are implemented

- Can only be built statically with diet libc!

- Compared to BusyBox: Much less momentum, user and developer base. (Last date 2008) Still misses key commands and features (ifconfig, for example)

- But can achieve smaller size than BusyBox on standalone executables

Alternatives: coreutils

- http://www.gnu.org/software/coreutils/
- Basic file, shell and text manipulation utilities of the GNU operating system
- These are the core utilities which are expected to exist on every operating system
- Previously these utilities were offered as three individual sets of GNU utilities, Fileutils, Shellutils, and Textutils.
  - Those three have been combined into a single set of utilities called Coreutils
- Used on BeagleBoard