



qvantel
delivering your vision

Inky Pinky Poky

**Somnath Avvari
Shakthi Kannan**

Version 1.0

GNU Free Documentation License

© 2008 Qvantel <http://www.qvantel.com>

Poky logo is © OpenedHand 2008

LN2440SBC/LP35

Building toolchain

Building u-boot

Cross-compiling Linux 2.6.18

TFTP setup

NFS setup

SD card setup



Poky

Machine configuration (ln2440sbc.conf)

Linux kernel config (linux-ln2440sbc_2.6.21.bb)

Build configuration (build/conf/local.conf)

Poky build

Testing



Hardware specifications

<http://littlechips.com/LN2440SBC.htm>

Hardware resources/downloads

<http://littlechips.com/downloads/>

Resources

<http://littlechips.com/resource.htm>

Support/documentation

<http://littlechips.com/support.htm>

Forums

<http://littlechips.com/forums/index.php>



LN2440SBC/LP35

Building toolchain

Building u-boot

Cross-compiling Linux 2.6.18

TFTP setup

NFS setup

SD card setup

Poky

Machine configuration (ln2440sbc.conf)

Linux kernel config (linux-ln2440sbc_2.6.21.bb)

Build configuration (build/conf/local.conf)

Poky build

Testing



Download and extract crosstool

<http://kegel.com/crosstool/crosstool-0.42.tar.gz>

Comment eval line in demo-arm.sh and add

```
eval `cat arm.dat gcc-3.4.3-glibc-2.3.5.dat` \  
sh all.sh --notest
```

Edit arm.dat to update TARGET

```
TARGET=arm-linux
```

Build

```
./demo.sh
```

Update PATH in ~/.bash_profile to use the built toolchain

```
PATH=/usr/local/arm/3.4.3/gcc-3.4.3-  
glibc-2.3.5/arm-linux/bin:$PATH"
```

LN2440SBC/LP35
Building toolchain

Building u-boot

Cross-compiling Linux 2.6.18
TFTP setup
NFS setup
SD card setup

Poky
Machine configuration (ln2440sbc.conf)
Linux kernel config (linux-ln2440sbc_2.6.21.bb)
Build configuration (build/conf/local.conf)
Poky build
Testing



Get u-boot LN2440SBC_uboot_r1.0.1.tar.gz and extract

http://www.littlechips.com/downloads/customer/CD_Images/LN2440SBC/Linux/U-BOOT/

Add to include/configs/ln2440sbc.h, after / #define KINGFISH 1 */*

```
#define CONFIG_CMDLINE_TAG 1  
#define CONFIG_INITRD_TAG 1  
#define CONFIG_SETUP_MEMORY_TAGS 1
```

Update boards/ln2440sbc/memsetup.S

```
#define B2_Tacs    0x3  
#define B2_Tcos    0x3  
#define B2_Tacc    0x7  
#define B2_Tcoh    0x3  
#define B2_Tah     0x3  
#define B2_Tacp    0x3  
#define B2_PMC     0x0
```


Update Makefile

```
CROSS_COMPILE = /usr/local/arm/3.4.3/gcc-3.4.3-  
glibc-2.3.5/arm-linux/bin/arm-linux-
```

Remove the following in cpu/arm920t/config.mk

```
“-mshort-load-bytes” “-msoft-float”
```

Build

```
make distclean  
make ln2440sbc_config  
make
```

LN2440SBC/LP35
Building toolchain
Building u-boot

Cross-compiling Linux 2.6.18

TFTP setup
NFS setup
SD card setup

Poky
Machine configuration (ln2440sbc.conf)
Linux kernel config (linux-ln2440sbc_2.6.21.bb)
Build configuration (build/conf/local.conf)
Poky build
Testing



Download and extract 2.6.18.1

**[http://www.kernel.org/pub/linux/kernel/v2.6/
linux-2.6.18.1.tar.bz2](http://www.kernel.org/pub/linux/kernel/v2.6/linux-2.6.18.1.tar.bz2)**

Download patch

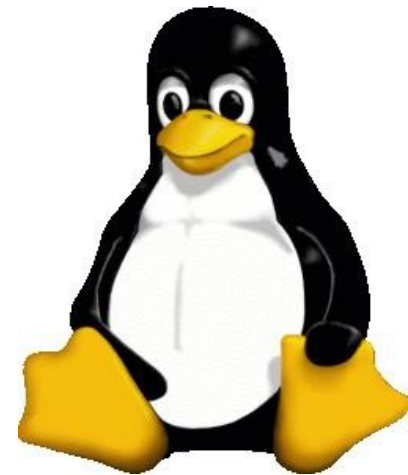
fox-2.6.18.1-ln2440sbc-0.7.patch

Apply patch

```
$ cd linux-2.6.18.1
```

```
$ patch -p1 < \
```

```
    /path/to/fox-2.6.18.1-ln2440sbc-0.7.patch
```



Update Makefile

```
CROSS_COMPILE = /usr/local/arm/3.4.3/gcc-3.4.3-  
glibc-2.3.5/arm-linux/bin/arm-linux-
```

Make oldconfig

```
$ make oldconfig
```

Build

```
$ make bootImage INITRD_PHYS=0x30800000 \  
INITRD=/path/to/LN2410disk_gz
```

Boot from u-boot

```
LN2440SBC# tftp 0x30f00000 bootImage  
LN2440SBC# go 0x30f00000
```

LN2440SBC/LP35
Building toolchain
Building u-boot
Cross-compiling Linux 2.6.18

TFTP setup

NFS setup
SD card setup

Poky
Machine configuration (ln2440sbc.conf)
Linux kernel config (linux-ln2440sbc_2.6.21.bb)
Build configuration (build/conf/local.conf)
Poky build
Testing



Install TFTP

```
$ sudo apt-get install xinetd tftpd tftp
```

```
/etc/xinetd.d/tftp
```

```
service tftp
```

```
{
```

```
    protocol          = udp
```

```
    port              = 69
```

```
    socket_type       = dgram
```

```
    wait              = yes
```

```
    user              = nobody
```

```
    server            = /usr/sbin/in.tftpd
```

```
    server_args       = /tftpboot
```

```
    disable           = no
```

```
}
```

Setup /tftpboot

```
$ sudo mkdir /tftpboot  
$ sudo chmod -R 777 /tftpboot  
$ sudo chown -R nobody /tftpboot
```

Start xinetd

```
$ sudo /etc/init.d/xinetd start
```

Check xinetd service

```
$ netstat -na | grep :69
```

u-boot TFTP settings

```
LN2440SBC# setenv serverip <TFTP IP>  
LN2440SBC# setenv ipaddr <board IP>  
LN2440SBC# saveenv
```

LN2440SBC/LP35
Building toolchain
Building u-boot
Cross-compiling Linux 2.6.18
TFTP setup
NFS setup
SD card setup

Poky
Machine configuration (ln2440sbc.conf)
Linux kernel config (linux-ln2440sbc_2.6.21.bb)
Build configuration (build/conf/local.conf)
Poky build
Testing



NFS Server

```
$ sudo apt-get install nfs-kernel-server \  
nfs-common portmap
```

NFS Client

```
$ sudo apt-get install nfs-common portmap
```

/etc/exports

```
/nfs 192.168.*.*(rw,sync)
```

CONFIG_CMDLINE

```
CONFIG_CMDLINE="console=ttySAC0  
root=/dev/nfs  
rw  
rootfstype=nfs  
nfsroot=192.168.1.103:/nfs  
ip=192.168.1.98:  
192.168.1.103:  
192.168.1.1:  
255.255.255.0::::"
```

Testing: NFS Client

```
sudo mount -t nfs <IP-address>:/nfs /mnt
```

LN2440SBC/LP35
Building toolchain
Building u-boot
Cross-compiling Linux 2.6.18
TFTP setup
NFS setup

SD card setup

Poky
Machine configuration (ln2440sbc.conf)
Linux kernel config (linux-ln2440sbc_2.6.21.bb)
Build configuration (build/conf/local.conf)
Poky build
Testing



NFS Server

```
CONFIG_CMDLINE="console=ttySAC0  
mem=64M  
root=/dev/mmcblk0p1  
rootfstype=ext2  
rootdelay=5  
rw"
```

In2440sbc.conf for poky-image-sato

```
IMAGE_ROOTFS_SIZE_ext2="102400"
```

LN2440SBC/LP35
Building toolchain
Building u-boot
Cross-compiling Linux 2.6.18
TFTP setup
NFS setup
SD card setup

Poky

Machine configuration (ln2440sbc.conf)
Linux kernel config (linux-ln2440sbc_2.6.21.bb)
Build configuration (build/conf/local.conf)
Poky build
Testing



Poky

<http://www.pokylinux.org>



Poky Handbook

<http://www.pokylinux.org/doc/poky-handbook.html>

OpenEmbedded

http://wiki.openembedded.net/index.php/Main_Page

Pinky scripts

<http://www.pokylinux.org/getit/>



BitBake

<http://bitbake.berlios.de/manual/>

Qvantel LN2440SBC/LP35 documentation

http://free-opensource.qvantel.net/mediawiki//index.php/LN2440_-_Single_Board_Computer

LN2440SBC/LP35
Building toolchain
Building u-boot
Cross-compiling Linux 2.6.18
TFTP setup
NFS setup
SD card setup

Poky

Machine configuration (ln2440sbc.conf)

Linux kernel config (linux-ln2440sbc_2.6.21.bb)
Build configuration (build/conf/local.conf)
Poky build
Testing



```
#-----  
#@TYPE: Machine  
#@NAME: LittleChips LN2440SBC  
#@DESCRIPTION: Machine configuration for the LittleChips LN2440SBC  
board  
#-----
```

```
TARGET_ARCH = "arm"  
# MACHINE_CLASS = "neo1973"  
PACKAGE_EXTRA_ARCHS = "armv4t ${MACHINE_CLASS}"
```

```
PREFERRED_PROVIDER_virtual/kernel = "linux-ln2440sbc"  
UBOOT_ENTRYPOINT = "30f00000"
```

```
MACHINE_FEATURES = "kernel26 vfat ext2"  
# MACHINE_DISPLAY_WIDTH_PIXELS = "480"  
# MACHINE_DISPLAY_HEIGHT_PIXELS = "640"  
# MACHINE_DISPLAY_ORIENTATION = "0"  
# MACHINE_DISPLAY_PPI = "285"  
# XSERVER = "xserver-kdrive-fbdev"
```



```
# MACHINE_EXTRA_RDEPENDS = "usbinit"  
# package machine specific modules  
# MACHINE_EXTRA_RRECOMMENDS = "\br/># kernel-module-gta01-pm-bt \  
# kernel-module-gta01-pm-gps \  
# kernel-module-gta01-pm-gsm \  
# kernel-module-gta01kbd \  
# kernel-module-s3cmci \  
# kernel-module-snd-soc-neo1973-wm8753 \  
# kernel-module-snd-soc-smdk2440 \  
# "
```

```
# do not outcomment, we bypass the sysvinit.bb logic here -- see FIC GTA01  
inittab  
# SERIAL_CONSOLE = "115200 ttySAC0"
```

```
# used by some images  
# ROOT_FLASH_SIZE = "60"
```

```
# extra jffs2 tweaks  
#EXTRA_IMAGECMD_jffs2 = "--little-endian --eraseblock=0x4000 --pad -n"
```

```
KERNEL_IMAGETYPE = "zImage"  
IMAGE_FSTYPES="ext2 cpio.gz tar.gz jffs2"  
IMAGE_ROOTFS_SIZE_ext2="102400"  
  
# build / upload tools  
# EXTRA_IMAGEDEPENDS += "dfu-util-native"  
  
# tune for S3C24x0  
include conf/machine/include/tune-arm920t.inc
```





LN2440SBC/LP35
Building toolchain
Building u-boot
Cross-compiling Linux 2.6.18
TFTP setup
NFS setup
SD card setup

Poky
Machine configuration (ln2440sbc.conf)
**Linux kernel config (linux-
ln2440sbc_2.6.21.bb)**
Build configuration (build/conf/local.conf)
Poky build
Testing



```
DESCRIPTION = "Linux Kernel"  
SECTION = "kernel"  
LICENSE = "GPL"
```

```
inherit kernel
```

```
SRC_URI = "file://linux-2.6.21.tar.bz2 \  
           file://linux-2.6.21-ln2410sbc-to-ln2440sbc.patch;patch=1 \  
           file://defconfig"
```

```
S = "${WORKDIR}/linux-2.6.21"
```

```
python __anonymous () {
```

```
    import bb
```

```
    kerneltype = bb.data.getVar('KERNEL_IMAGETYPE', d, 1) or "  
    if kerneltype == 'ulmage':  
        depends = bb.data.getVar("DEPENDS", d, 1)  
        depends = "%s u-boot-mkimage-openmoko-native" % depends  
        bb.data.setVar("DEPENDS", depends, d)
```

```
}
```

```
do_configure_prepend() {  
    cp ${WORKDIR}/defconfig ${S}/.config  
}  
  
do_install_prepend() {  
    if test -e arch/${ARCH}/boot/Image ; then  
        ln -f arch/${ARCH}/boot/Image arch/${ARCH}/boot/ulmage  
    fi  
  
    if test -e arch/${ARCH}/boot/images/ulmage ; then  
        ln -f arch/${ARCH}/boot/images/ulmage arch/${ARCH}/boot/ulmage  
    fi  
  
    if test -e arch/${ARCH}/kernel/vmlinux.lds ; then  
        ln -f arch/${ARCH}/kernel/vmlinux.lds arch/${ARCH}/boot/vmlinux  
    fi  
}
```



LN2440SBC/LP35
Building toolchain
Building u-boot
Cross-compiling Linux 2.6.18
TFTP setup
NFS setup
SD card setup

Poky
Machine configuration (ln2440sbc.conf)
Linux kernel config (linux-ln2440sbc_2.6.21.bb)

Build configuration
(build/conf/local.conf)

Poky build
Testing




```
# Where to cache the files Poky downloads
DL_DIR = "${OEROOT}/sources"
BBFILES = "${OEROOT}/meta/packages/*/*.bb"

# Poky has various extra metadata collections (openmoko, extras).
# BBFILES = "\
#   ${OEROOT}/meta/packages/*/*.bb
#   ${OEROOT}/meta-extras/packages/*/*.bb
#   ${OEROOT}/meta-openmoko/packages/*/*.bb
#   "
# BBFILE_COLLECTIONS = "normal extras openmoko"
# BBFILE_PATTERN_normal = "^${OEROOT}/meta/"
# BBFILE_PATTERN_extras = "^${OEROOT}/meta-extras/"
# BBFILE_PATTERN_openmoko = "^${OEROOT}/meta-openmoko/"
# BBFILE_PRIORITY_normal = "5"
# BBFILE_PRIORITY_extras = "5"
# BBFILE_PRIORITY_openmoko = "5"

BBMASK = ""
```

```
# The machine to target  
MACHINE = "ln2440sbc"
```

```
# Other supported machines  
#MACHINE ?= "qemux86"  
#MACHINE ?= "c7x0"  
#MACHINE ?= "akita"  
#MACHINE ?= "spitz"  
#MACHINE ?= "nokia770"  
#MACHINE ?= "nokia800"  
#MACHINE ?= "fic-gta01"  
#MACHINE ?= "bootcdx86"  
#MACHINE ?= "cm-x270"  
#MACHINE ?= "em-x270"  
#MACHINE ?= "htcuniversal"  
#MACHINE ?= "mx31ads"  
#MACHINE ?= "mx31litekit"  
#MACHINE ?= "mx31phy"  
#MACHINE ?= "zylonite"
```



```
DISTRO = "poky"  
# For bleeding edge / experimental / unstable package versions  
# DISTRO ?= "poky-bleeding"  
  
# EXTRA_IMAGE_FEATURES allows extra packages to be added to the  
# generated images  
  
EXTRA_IMAGE_FEATURES = "tools-debug tools-profile tools-testapps  
debug-tweaks"  
  
# the default features for those machines.  
EXTRA_IMAGE_FEATURES_c7x0 = "tools-testapps debug-tweaks"  
EXTRA_IMAGE_FEATURES_mx31phy = "debug-tweaks"  
EXTRA_IMAGE_FEATURES_mx31ads = "tools-testapps debug-tweaks"
```

```
# A list of packaging systems used in generated images  
#PACKAGE_CLASSES ?= "package_deb package_ipk"  
PACKAGE_CLASSES = "package_ipk"
```

```
# POKYMODE controls the characteristics of the generated  
packages/images by  
# telling poky which type of toolchain to use.  
# POKYMODE = "external-eabi"
```

```
# Uncomment this to specify where BitBake should create its temporary files.  
TMPDIR = "${OEROOT}/build/tmp"
```

```
# Uncomment and set to allow bitbake to execute multiple tasks at once.  
# Note, This option is currently experimental - YMMV.  
# BB_NUMBER_THREADS = "1"  
# PARALLEL_MAKE = "-j 4"
```

Uncomment this if you are using the Openedhand provided qemu deb - see
README

#ASSUME_PROVIDED += "qemu-native"

Comment this out if you don't have a 3.x gcc version available and wish
poky to build one for you. The 3.x gcc is required to build qemu-native.

ASSUME_PROVIDED += "gcc3-native"

Uncomment this if you want BitBake to emit the log if a build fails.

BBINCLUDELOGS = "yes"

Specifies a location to search for pre-generated tarballs when fetching
a cvs:// URI. Uncomment this, if you not want to pull directly from CVS.

CVS_TARBALL_STASH = "http://folks.o-hand.com/~richard/poky/sources/"

ENABLE_BINARY_LOCALE_GENERATION = "1"

LN2440SBC/LP35
Building toolchain
Building u-boot
Cross-compiling Linux 2.6.18
TFTP setup
NFS setup
SD card setup

Poky
Machine configuration (ln2440sbc.conf)
Linux kernel config (linux-ln2440sbc_2.6.21.bb)
Build configuration (build/conf/local.conf)

Poky build

Testing



Source environment variables

```
$ source poky-init-build-env
```

Clean package

```
$ bitbake -cclean linux-ln2440sbc-2.6.21
```

Build package

```
$ bitbake linux-ln2440sbc-2.6.21
```

Build poky-image-minimal

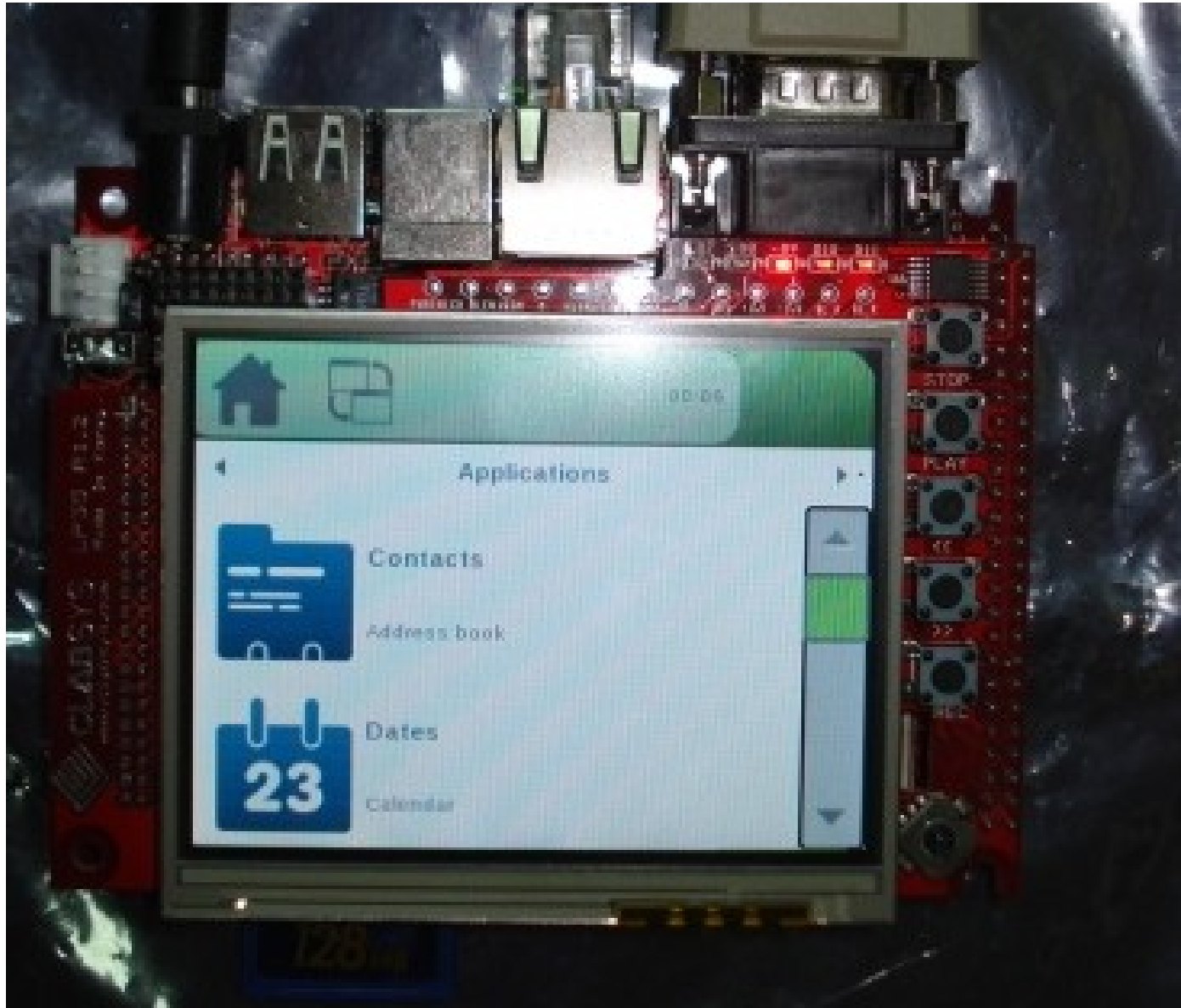
```
$ bitbake poky-image-minimal
```

```
/* Go and watch a 20-20 cricket match */
```

Build poky-image-sato

```
$ bitbake poky-image-sato
```

```
/* Go and watch a Test match */
```



LN2440SBC/LP35
Building toolchain
Building u-boot
Cross-compiling Linux 2.6.18
TFTP setup
NFS setup
SD card setup

Poky
Machine configuration (ln2440sbc.conf)
Linux kernel config (linux-ln2440sbc_2.6.21.bb)
Build configuration (build/conf/local.conf)
Poky build

Testing

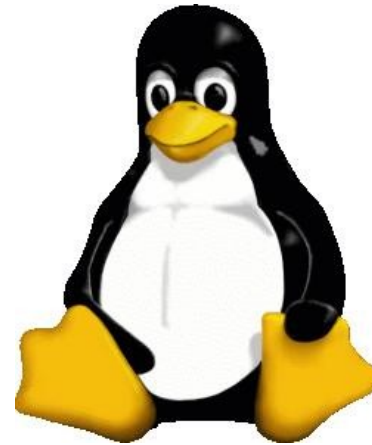


Index	Toolchain	Kernel	Filesystem
1	Pre-built	2.4.20	ramdisk
2	Cross-tool	2.6.18.1	bootplImage
3	Cross-tool	2.6.18.1	ramdisk
4	Poky	2.6.18.1	ramdisk
5	Poky	2.6.21	ramdisk
6	Poky	2.6.21	Poky-image-minimal (NFS)
7	Poky	2.6.21	Poky-image-minimal (SD)
8	Poky	2.6.21	Poky-image-sato (SD)

**Inky Pinky Poky ...
FOSS has a Shakthi ...**

**Somnath joined ...
“Inky” was coined ...**

**We booted Poky ...
Ended up at Osmania University!**



- **Richard Grot (“ragrot”) and “foxxx” for early work on LN2440SBC/LP35**
- **Qvantel for the LN2440SBC/LP35**
- **OpenedHand for poky and pinky**
- **The geeks (or nerds?) at #poky**
- **Mukt.in for accepting the talk**
- **Audience for their patience**





Whassup?