BUILDING FROM SOURCE DEBIAN 12 KERNEL + PREEMPT-RT + LINUXCNC

Building Debian 12 Kernel + Preempt-rt

```
# This procedure assumes you have installed Debian 12 on your computer.
# Getting Computer Ready
    sudo apt update
    sudo apt upgrade
# Install dependencies and the software for compiling the kernel and linuxcnc
    sudo apt-get install -y build-essential autoconf libtool libtool-bin bison flex libssl-dev libelf-dev libacl1-dev
    libncurses-dev dwarves fakeroot
# Following boxed steps are  for installing/upgrading kernel and Preempt-RT patch
```

```
# From home directory, create a subdirectory:
    cd ~
    mkdir rtkernel
    cd rtkernel
# Download patch
    wget https://cdn.kernel.org/pub/linux/kernel/projects/rt/6.6/patch-6.6.36-rt35.patch.gz
# Download kernel
    wget https://mirrors.edge.kernel.org/pub/linux/kernel/v6.x/linux-6.6.36.tar.gz

# Unzip the archives
    tar xvf linux-6.6.36.tar.gz
    gunzip patch-6.6.36-rt35.patch.gz
    cd linux-6.6.36
# Patch the kernel with the RT patch.
    cat ~/rtkernel/ patch-6.6.36-rt35.patch.gz | patch -p1
# Clean the source tree from any remnants of any build that may be left.
    sudo make clean
    sudo make mrproper
# To ensure that the RT kernel supports the current distribution, copy existing configuration to .config:
    cp -v /boot/config-$(uname -r) .config
# To configure the Kernel and enable realtime preeempt:
     make menuconfig
```

- With <Select> highligh and cursor on General Setup <hit enter>
- Navigate down to Preemption Model (voluntary kernel preemption (desktop) <hit enter>
- Navigate down and select Fully Preemptible Kernel (Real-Time) <hit enter>
- save and exit

```
# This one liner will eliminate errors.
    sudo sed -i '/CONFIG_SYSTEM_TRUSTED_KEYS/s/^/#/g' .config
    scripts/config --disable SYSTEM_TRUSTED_KEYS
# Compile the Kernel
    sudo make -j$(nproc)
# Install the kernel modules
    sudo make modules && sudo make modules_install
# Install the kernel
    sudo make install
    sudo update-grub; sudo update-grub2; sudo update-initramfs -u
    sudo apt clean; sudo apt autoclean; sudo apt autoremove; sudo apt remove; sudo apt purge
# Reboot
    sudo reboot now
```

Check the kernel and rt version

```
uname -a
```

Done

BUILD LINUXCNC 2.9 RIP FROM SOURCE

Getting Computer Ready

```
sudo apt update
sudo apt upgrade
```

Install required dependencies for LinuxCNC and qtpyvcp (cut and paste this whole section to your cmd line and hit enter)

```
sudo apt install -y  debhelper dh-python libudev-dev tcl8.6-dev tk8.6-dev bwidget tclx8.4 libeditreadline-dev asciidoc dblatex docbook-xsl dvipng ghostscript graphviz groff imagemagick inkscape source-highlight w3c-linkchecker xsltproc texlive-extra-utils texlive-font-utils texlive-fonts-recommended texlive-lang-cyrillic texlive-lang-french texlive-lang-german texlive-lang-polish texlive-lang-spanish texlive-latex-recommended asciidoc-dblatex  libxmu-dev libgl1-mesa-dev libgtk2.0-dev libgtk-3-dev gettext intltool autoconf libmodbus-dev libusb-1.0-0-dev psmisc yapps2 libepoxy-dev gstreamer1.0-plugins-bad  espeak espeak-data espeak-ng freeglut3-dev gdal-data gstreamer1.0-tools libaec0 libarmadillo11 libarpack2 libcfitsio10 libcharls2 libdap27 libdapclient6v5 libespeak1 libfreexl1 libfyba0 libgdal32 libgdcm3.0 libgeotiff5 libgif7 libgtksourceview-3.0-dev libhdf4-0-alt libhdf5-103-1 libhdf5-hl-100 libimagequant0 libkmlbase1 libkmldom1 libkmlengine1 liblept5 libmariadb3 libminizip1 libnetcdf-dev libodbc1 libogdi4.1 libportaudio2 libpq5 libprotobuf-c-dev libqhull8.0 librttopo1 libsocket++1 libspatialite7 libsuperlu5 libsz2 libtbb-dev libtesseract5 liburiparser1 libxerces-c3.2 libxml2-dev mariadb-common mesa-utils mysql-common odbcinst odbcinst1debian2 proj-bin proj-data tcl-tclreadline geotiff-bin gdal-bin glew-utils libgtksourceview-3.0-doc libhdf4-doc libhdf4-alt-dev hdf4-tools odbc-postgresql tdsodbc ogdi-bin netcat-openbsd dpkg-dev libgle3 libgeos-dev libgeos-c1v5 libglew2.2 libgdal-dev libgeos-dev libglew-dev libnetcdf-dev libopencv-dev libproj-dev libprotobuf-dev libtbb-dev libtesseract-dev libtk-img python3-tk qttools5-dev qttools5-dev-tools python3-pyqt5 python3-dbus.mainloop.pyqt5 python3-pyqt5.qtopengl python3-pyqt5.qsci python3-pyqt5.qtmultimedia python3-pyqt5.qtquick qml-module-qtquick-controls python3-pyqt5.qtsvg python3-pyqt5.qtwebkit pyqt5-dev-tools qttools5-dev qttools5-dev-tools python3-pilkit python3-pil.imagetk python3-setuptools python3-wheel python3-pip python3-yapps python3-serial python-configobj-doc python3-sqlalchemy python3-espeak python3-gi-cairo python3-olefile python3-opencv python3-opengl python3-pil python3-configobj python3-xlib python3-lxml libboost-python-dev python3-pil.imagetk python3-pil python3-docopt python3-psutil python3-qtpy python3-distro libqt5multimedia5-plugins python3-dev
```

FROM YOUR HOME DIRECTORY:

```
cd ~
```

Create working directory

```
mkdir dev
cd dev
```

Install git if you have not installed it yet.

```
sudo apt install git-all
```

Download LinuxCNC source

```
git clone https://github.com/linuxcnc/linuxcnc.git
```

Switch branch to Ver 2.9

Note: At this stage LinuxCNC git is pointing to master which is 2.10. To clone LinuxCNC 2.9 issue following command:

```
cd linuxcnc
git checkout 2.9
```

COMPILING LINUXCNC FOR RUN IN PLACE RIP MODE

```
cd ~/dev/linuxcnc/src
./autogen.sh
./configure --with-realtime=uspace
```

```
    make -j$(nproc)
# SETUID IS A LINUX FILE PERMISSION SETTING THAT ALLOWS A USER TO EXECUTE FILE PROGRAM WITH THE PERMISSION OF THE OWNER OF THAT FILE
    sudo make setuid
# RUN IN PLACE NEEDS TO SOURCE THE ENVIRONMENT BEFORE RUNNING ANY OF THE LINUXCNC SOFTWARE.
    cd ~
    source ~/dev/linuxcnc/scripts/rip-environment
```

Note: This command must be issued every time a new shell is open.

```
# RUN LINUXCNC
    linuxcnc
#DONE
```