Hardware requirements and computer configuration Linumeric-LPT V3 EN

Computer configuration is a very important issue from the point of view of the operation of the real-time system.
If a computer is to become a machine controller, there must be no systems or dependencies that will affect the operation of that computer. You should immediately assume that the computer used to control the machine is not a computer for games and entertainment.

1. **Hardware requirements**
   On the linuxcnc website you can find hardware requirements provided by the software developers.
   - processor clocked at least 700 MHz x86 (1.2 GHz x86 processor recommended)
   -at least 384 MB RAM (512 MB - 1 GB recommended)
   - hard drive at least 8 GB
   -a graphics card with a resolution of at least 1024 x 768 that does not use proprietary NVidia or ATI fglrx drivers and that is not an on-board video chipset that shares main memory with the processor
   -internet connection (not strictly needed, but very useful)

   However, these requirements are somewhat outdated and apply to older versions of the system and software.
   Due to the fact that handling communication via Ethernet requires additional computer load, and in order to obtain better operating parameters, the manufacturer of the **Linumeric-LPT V3 device recommends using a computer with a 64-bit processor, at least 4 cores (4 physical cores) with a clock speed of at least 2GHz and RAM of at least 2 GB for better smoothness and reliability of the Linux system and LinuxCNC software with Linumeric-LPT V3.**

2. **What determines the correct operation of LinuxCNC?**

   Please remember that it is not the processor speed or the amount of RAM that determines whether a computer is suitable for real-time operation. The most important parameter is the time it takes for the processor to start executing the task from the moment the task is requested. The ideal value would be 0, i.e. the processor would perform the task immediately, but this time is different and variable for different types of computers. The deviation from the base time is called jitter. If the jitter value is below 20us, the computer is very suitable for working with LinuxCNC. If the value is up to 50us, you can still use the computer to control using LinuxCNC, but you must take into account that the step control frequency will be lower. If the jitter values exceed 50us, you probably have to take into account that the computer is not suitable for this task, but with the Linumeric-LPT device it is still possible. However, it is recommended to use a computer with a jitter value below 50 us.

3. **Computer test before installing LinuxCNC**

   At http://wiki.linuxcnc.org/cgi-bin/wiki.pl?Latency-Test

   there is a list of tested hardware configurations along with the results. However, if we want to test our configuration, just perform Latency-Test before installing anything. To do this, download the ready-made .iso image of the Debian system from LinuxCNC from the LinuxCNC websi-

te, save it on a bootable medium (CD, pendrive) and run the so-called version on your computer. live, i.e. loaded into memory directly from the bootable media.

To make testing and installation as easy as possible, a special distribution of Debian 12 has been prepared, dedicated to LinuxCNC and Linumeric-LPT V3.

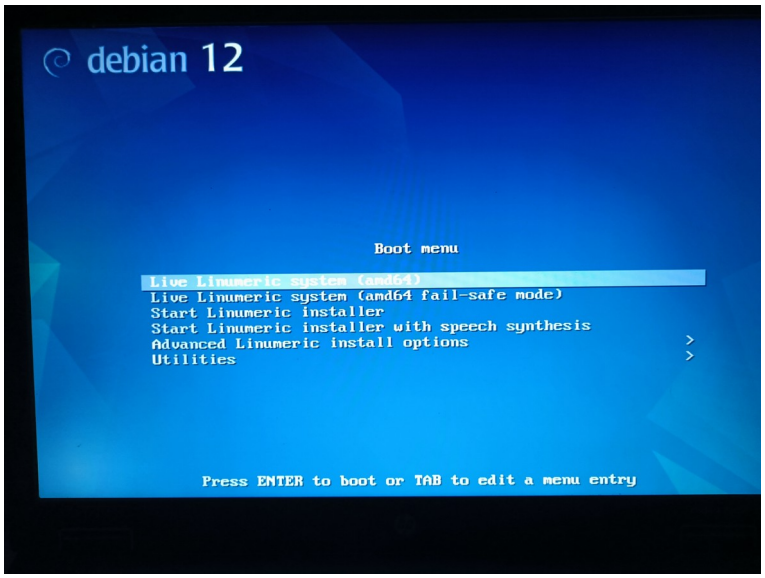
-Download the system image by clicking the link below:

debian-live-Linumeric-amd64-xfce.iso

-Create a bootable media with the downloaded image

-Turn on the computer that will be tested with the option to boot from USB or CD (depending on the media we have)

4. -When the boot menu appears, select **Live Linumeric system (amd64)** and press TAB or e (Check out the hint at the bottom)

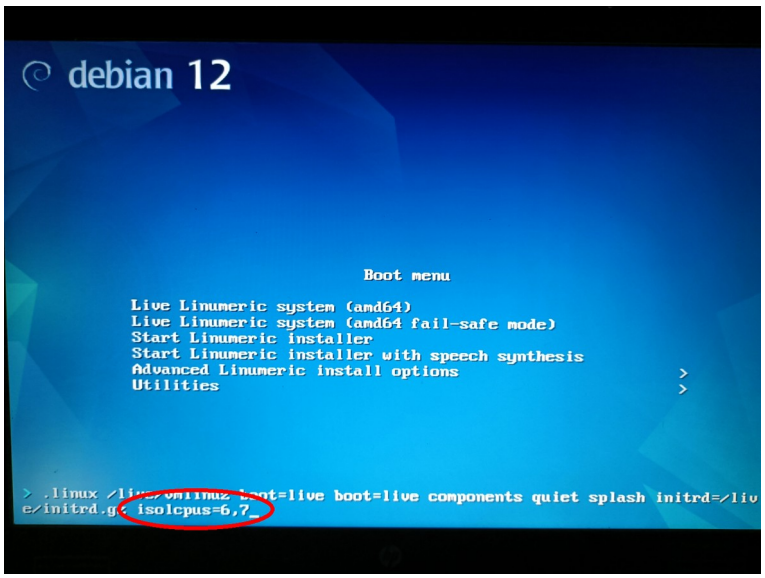


-Enter the isolation of the 2 processor cores with the highest number, via the isolcpus option.

Cores are numbered from 0, so if there are 4 cores, enter isolcpus=2.3, if there are 8 cores, enter isolcpus=6.7.

It is about the number of cores available for the system, i.e. if the computer has 4 physical cores with 2 threads per core, then the system has 8 cores.

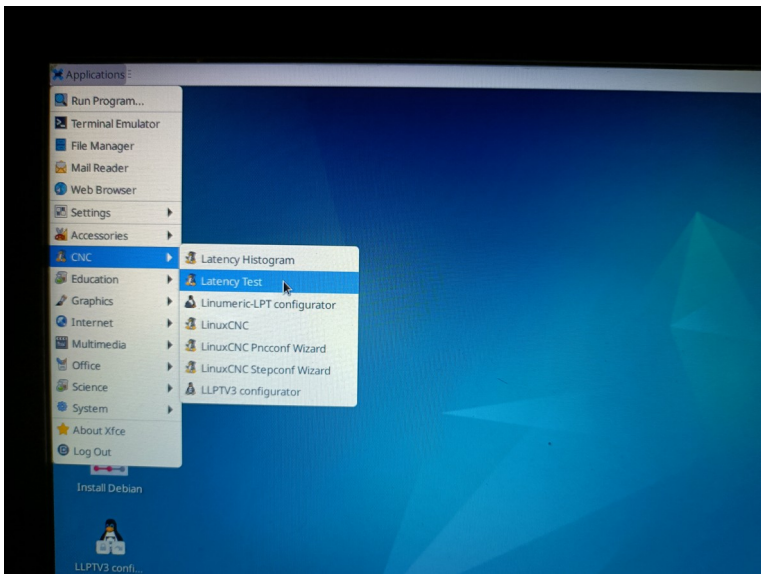
Isolcpus means that the system does not use these cores and thanks to this they can devote all their time to servicing realtime processes.



Press Enter and a fully working system will boot, with Linumeric-LPT support installed.

Before performing the latency test, it is recommended to turn off Wifi (if it is on your computer).

After starting the system, click on the menu -> CNC->Latency Test



5. **How to perform Latency-Test**

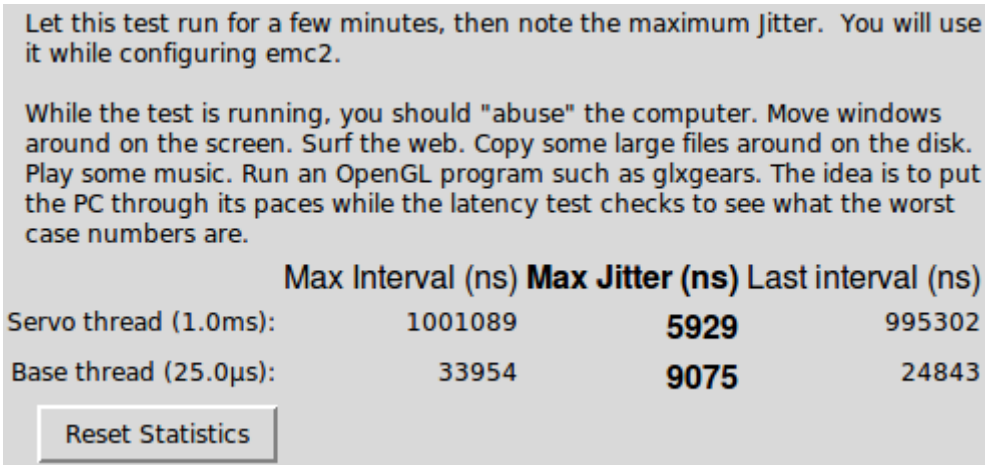
   Latency-test is a tool provided with Linux-CNC that is used to test your computer for real-time operation. Latency test configures and runs one or two threads in real time:

   -Basic - fast with a period of 25us

   -Servo - slow with a period of 1.0ms.

   This default configuration follows the configuration pattern for LinuxCNC.

   Each time a thread is started by the scheduler, the time elapsed from the previous thread run to the current thread run is measured. In an ideal system, this time would always be equal to the working period of a given thread. In fact, the measured value differs from the thread's operating period and the value of this difference (both plus and minus) is referred to as Jitter.



ATTENTION! LinuxCNC should not be run during Latency-test.

Leave Latency-test running for at least 15 minutes. During this time, you should load your computer:

-copy large files

-browse the internet

-move windows around the screen

The measurement value is the maximum value from the Max Jitter column, i.e. in the example from the screenshot above it is 9.075us.

More information:
http://linuxcnc.org/docs/html/install/latency-test.html

6. **How to prepare your computer for LinuxCNC**

If your computer does not give satisfactory results during Latency-Test, this is not a reason to delete it. You should check whether it has any option enabled (e.g. some energy management mechanism) that causes long delays.

Graphics Card

Multiple onboard video chips result in poor real-time performance. The worst are those that use part of the system RAM for video ("shared memory"). If you are having real-time problems with a system using the integrated graphics card, the first thing to do is to turn it off and connect another graphics card. Additionally, the closed-source NVidia driver does not work in real time, so if you have an NVidia card, you should try the "nv" or "vesa" drivers. In general, NVIDIA should be avoided.

Sound Card

Disable the sound card in BIOS if possible. The machine controller is not a computer for games and entertainment, there is no need for a sound card while the machine is running.

Other settings

Generally, you should disable everything in the BIOS that is not necessary for operation. All power saving modes, CPU frequency scaling etc.

Source:
http://wiki.linuxcnc.org/cgi-bin/wiki.pl?TroubleShooting