Linux Kernel Compilation

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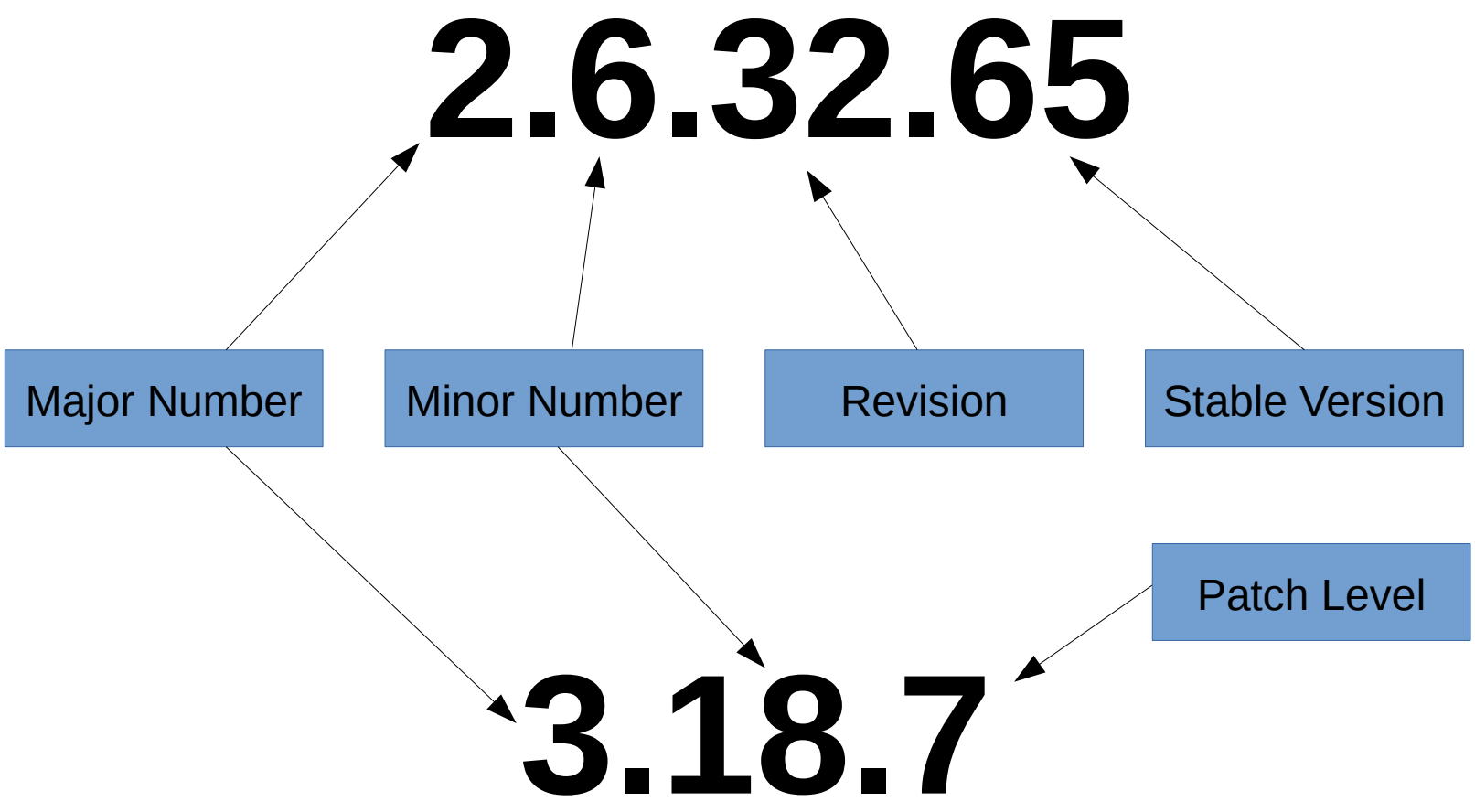
Linux

- Linux is not an Operating System.
- Linux is a kernel.
- A kernel is a program that allocates and controls hardware and software resources in a system.
- Linux Distributions use the Linux kernel together with the GNU Operating System.

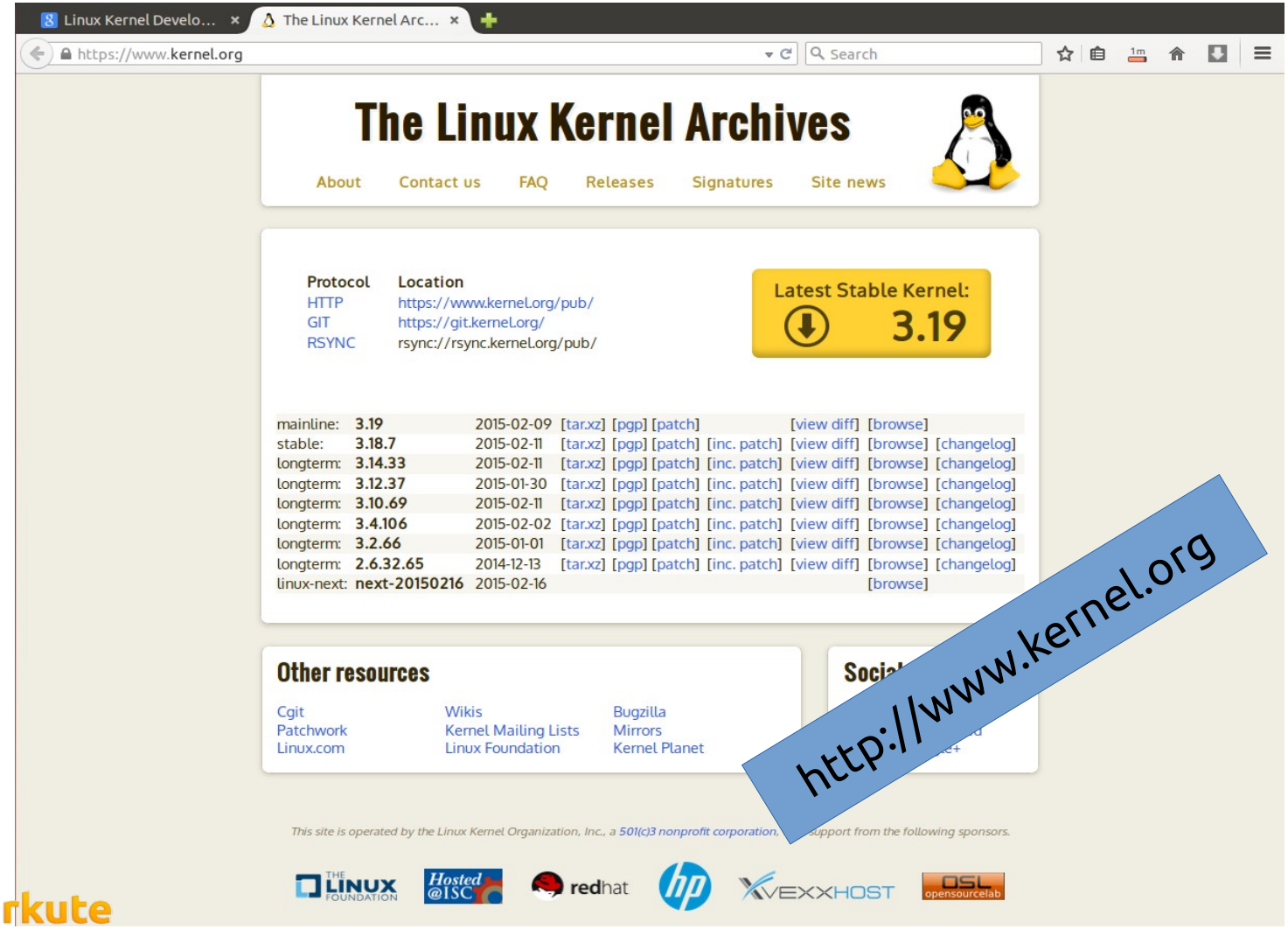
Linux Kernel- Types of releases

- The Linux kernel is currently maintained by Linus Torvalds and a few hundred developers.
- Releases are numbered in a very ordered fashion.
  - *major.minor.patchlevel*
- Odd minor numbers are development kernels
  - 3.18.7 latest stable kernel
  - 4.0 latest development kernel

Linux Kernel- Versions



Linux Kernel Maintener



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Linux Kernel Categories

- **Prepatch**

  Prepatch or "RC" kernels are mainline kernel pre-releases that are mostly aimed at other kernel developers and Linux enthusiasts. They must be compiled from source and usually contain new features that must be tested before they can be put into a stable release. Prepatch kernels are maintained and released by Linus Torvalds.
- **Mainline**

  Mainline tree is maintained by Linus Torvalds. It's the tree where all new features are introduced and where all the exciting new development happens. New mainline kernels are released every 2-3 months.
- **Stable**

  After each mainline kernel is released, it is considered "stable." Any bug fixes for a stable kernel are backported from the mainline tree and applied by a designated stable kernel maintainer.
- **Longterm**

  There are usually several "longterm maintenance" kernel releases provided for the purposes of backporting bugfixes for older kernel trees. Only important bugfixes are applied to such kernels and they don't usually see very frequent releases, especially for older trees.

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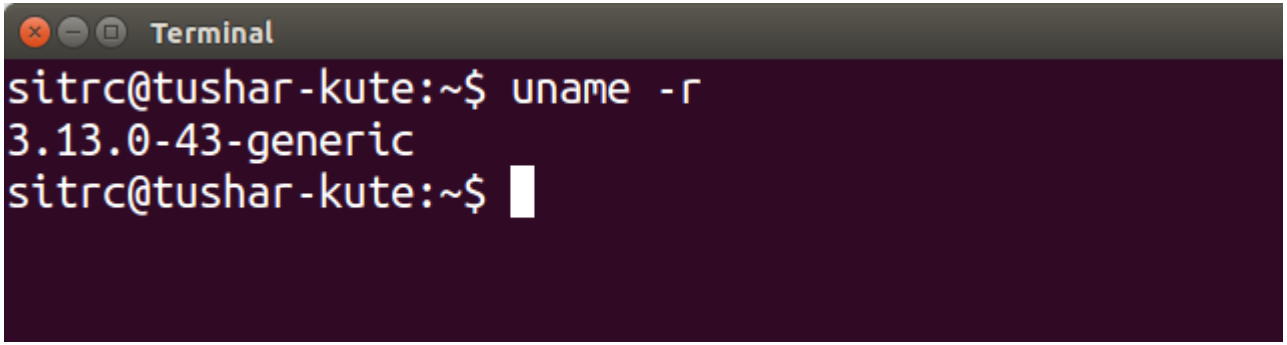
Find out kernel version

- Find out the version of the kernel:

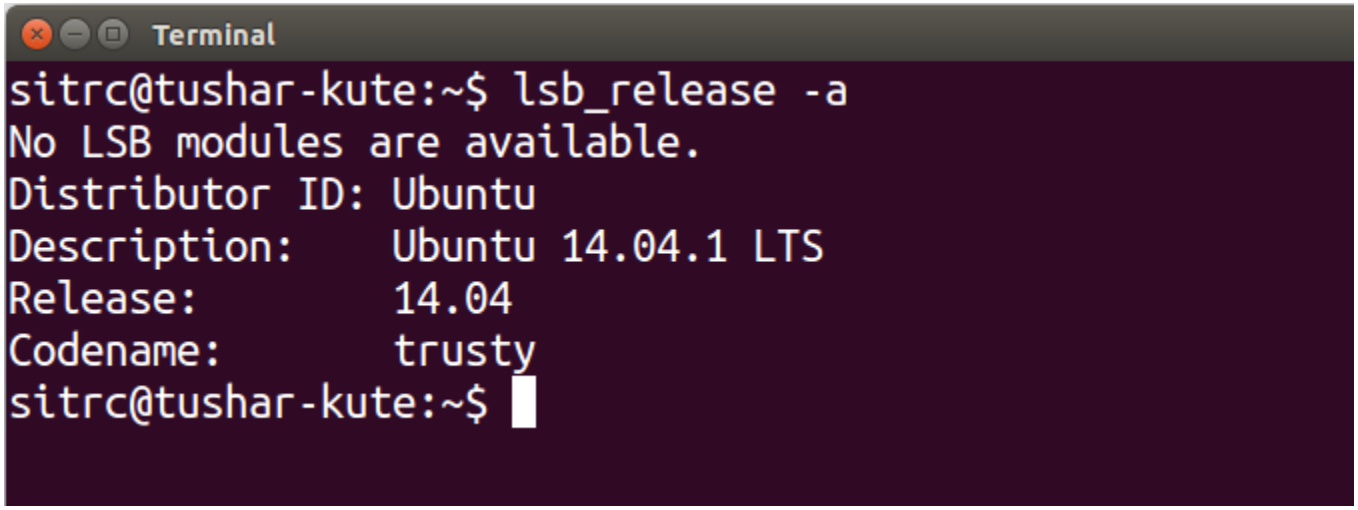
```
uname -r
```



Find out operating system version

- Find out the version of the kernel:

```
lsb_release -a
```

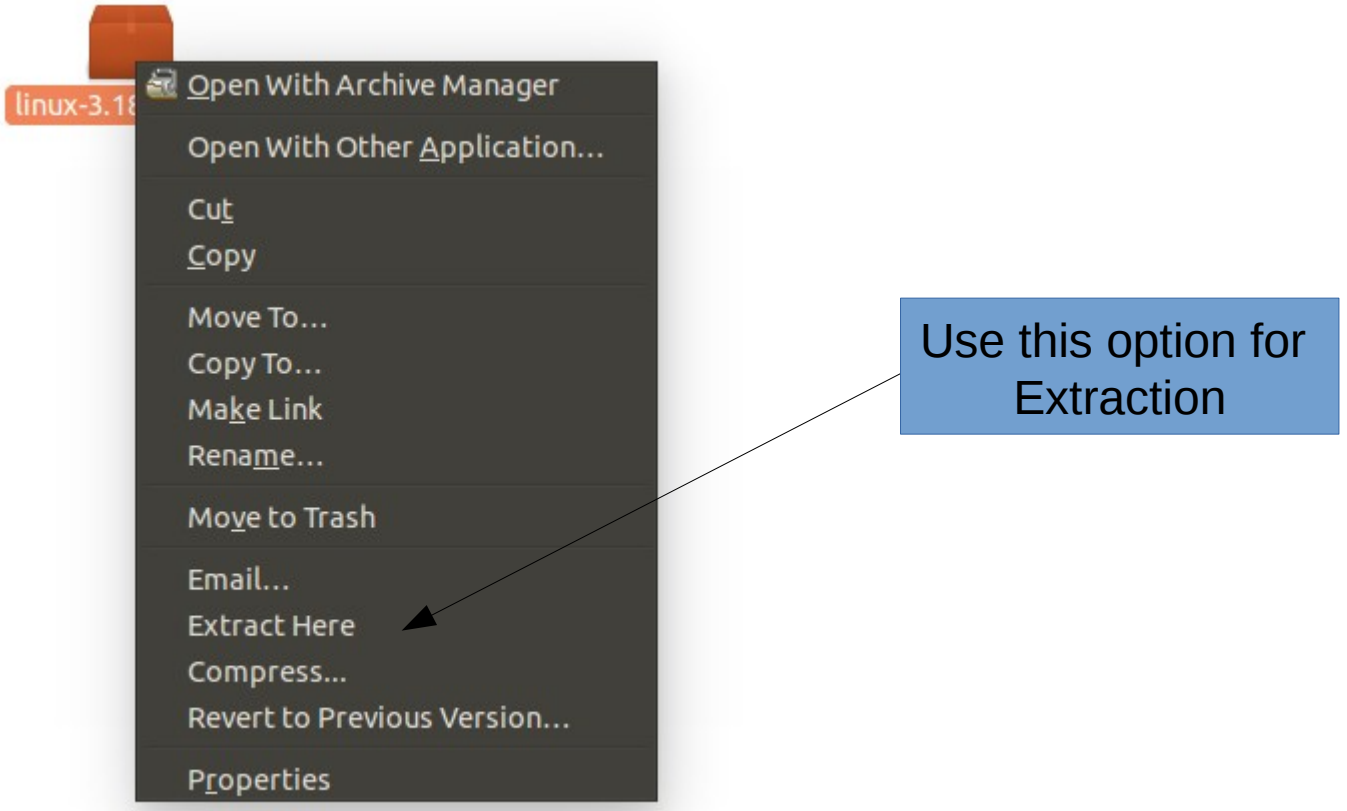


Linux Kernel Compilation

- Download the kernel source code from http://kernel.org
  - Actual link:
    https://www.kernel.org/pub/linux/kernel/v3.x/linux-3.18.1.tar.xz
  - Can be downloaded by command:
    wget https://www.kernel.org/pub/linux/kernel/v3.x/linux-3.18.1.tar.xz
  - Downloaded file is: linux-3.18.1.tar.xz

- Extract the file using command or GUI:
  - **`tar -xvf linux-3.18.1.tar.xz`**

Extraction using GUI



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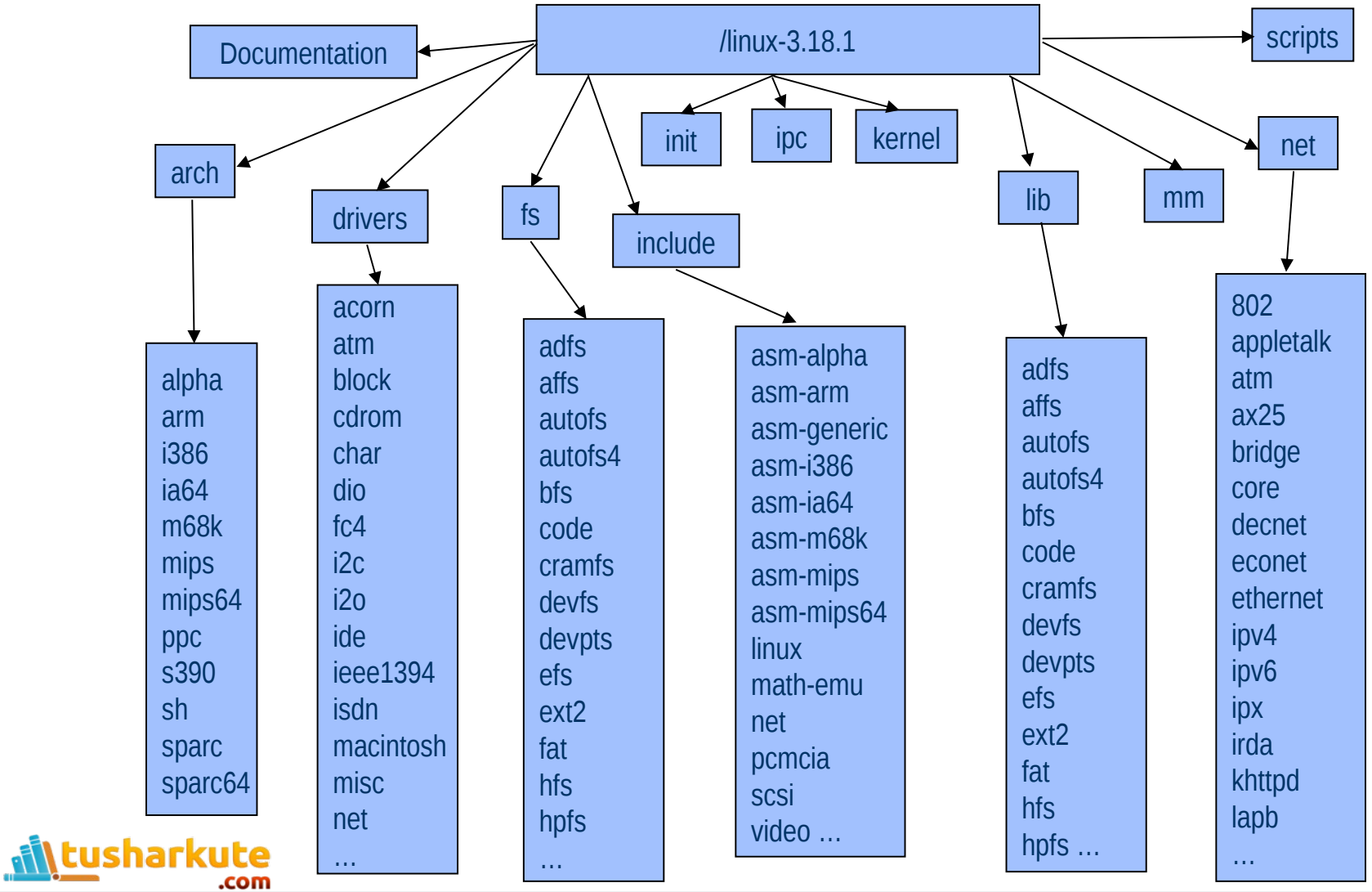
Linux Source Tree Layout



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Linux Kernel Compilation

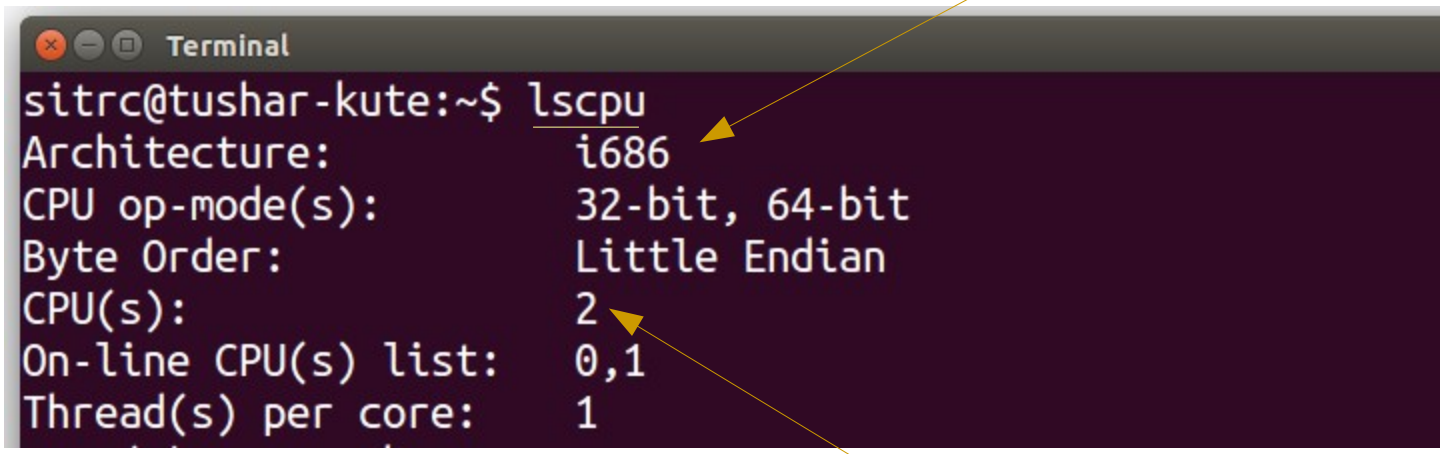
- Open the terminal and change the directory to the Linux kernel source code.
  - **`cd linux-3.18.1`**
- `sudo apt-get update`
- `sudo apt-get libncurses5-dev`
  - *ncurses* (new curses) is a programming library that provides an API which allows the programmer to write text-based user interfaces in a terminal-independent manner. It is a toolkit for developing "GUI-like" application software that runs under a terminal emulator.

Linux Kernel Compilation

- Configure the kernel:
  - **`sudo make menuconfig`**
  - Make the configuration changes as per your requirements.
- Other ways to do configuration (optional):
  - **`sudo make oldconfig`**
  - **`sudo make xconfig`**
- Compile the Linux kernel:
  - **`sudo make`**
- The compilation process can be shifted to all the cores of the system. (*Next slide).*

Check the number cores in CPU

- The number of cores of the CPU can be found by:
  - **`lscpu`**



Linux Kernel Compilation

- The compilation process can be shifted to all the cores of the system (2 cores or 4 cores).
  - **`sudo make -j2`**
- After completion of the process, install the modules.
  - **`sudo make modules_install install`**
- The above command will install the Linux Kernel 3.18.1 into your system. It will create some files under /boot/ directory and it will automatically make a entry in your grub.cfg. Check whether it made correct entry and check for the files it created.

Linux Kernel Compilation

- The files under /boot/ directory are,
  - system.map3.18.1
  - vmlinuz3.18.1
  - initrd.img3.18.1
  - config3.18.1
- Restart your system manually or type:
  - **`sudo reboot`**
- After restart, check the Linux kernel version:
  - **`uname -r`**

Thank you

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http://tusharkute.com

Blogs
http://digitallocha.blogspot.in
http://kyamputar.blogspot.in

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