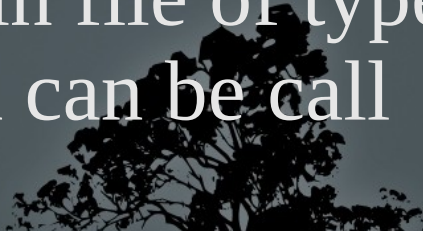# LPIC-1 101-500 – Lesson 14

102.3 Manage shared libraries

Libraries

- Libraries are resources collections used in software development.

- They can contain code, routines, classes, variables, constants or types.

- The are categorized in static and shared libraries.

- In static libraries the code is embedded in the main program during linking.

- In shared libraries the code resides in file of type. **lib*.so*** (so = Shared Object) and can be call from many other programs.

Library Paths

- **/lib**   # system programs libraries path.
- **/lib32** # location of 32bit libraries in a 64bit system.
- **/lib64** # location of 64bit libraries in a 32bit system.
- **/usr/lib**   # user programs libraries path.
- **/usr/local/lib/**   # alternative programs libraries path.
- **$ find / -name "*.so*"** # find all shared libraries (**.so**.) in the system.

Use `ldd` to find the libraries dependencies of programs

- **$ ldd /bin/bash** # show bash shared libraries.

  ```
  linux-vdso.so.1 =>  (0xb773d000)
  libncurses.so.5 => /lib/libncurses.so.5 (0xb7703000)
  libdl.so.2 => /lib/tls/i686/cmov/libdl.so.2 (0xb76ff000)
  libc.so.6 => /lib/tls/i686/cmov/libc.so.6 (0xb75b0000)
  /lib/ld-linux.so.2 (0xb773e000)
  ```

- **$ ldd /usr/bin/top** # show top shared libraries.

  ```
  linux-vdso.so.1 =>  (0x00007fff89ee3000)
  libproc-3.2.8.so => /lib/libproc-3.2.8.so
  (0x00007fc272a84000)
  libncurses.so.5 => /lib/libncurses.so.5
  (0x00007fc272863000)
  libc.so.6 => /lib/x86_64-linux-gnu/libc.so.6
  (0x00007fc2724c3000)
  libdl.so.2 => /lib/x86_64-linux-gnu/libdl.so.2
  (0x00007fc2722bf000)
  libtinfo.so.5 => /lib/libtinfo.so.5 (0x00007fc272098000)
  /lib64/ld-linux-x86-64.so.2 (0x00007fc272cce000)
  ```

Dynamic Linker *ld.so* and *ld-linux.so*

- **$ ls -l /lib/ld*** # show dynamic linker on old systems.

- **$ ls -l /lib64/ld-linux-x86-64.so.2** # on new systems.

- The **ld-\<version\>.so** or **ld-linux.so.\<x\>** file is the dynamic linker responsible to find the shared libraries dependencies for all programs.

- If a library is missing the program will fail.

Configuration files of Dynamic Linker

- **$ ls -lad /etc/ld.*** # show configuration files
                           # for Dynamic Linker.

  ```
  -rw-r--r-- 1 root root 138216 2011-10-24 14:26
  /etc/ld.so.cache
  -rw-r--r-- 1 root root     34 2011-08-27 07:50
  /etc/ld.so.conf
  drwxr-xr-x 2 root root   4096 2011-10-15 07:06
  /etc/ld.so.conf.d
  ```

- **/etc/ld.so.cache** # binary configuration file. This provides faster access to the configuration than text files.

- **/etc/ld.so.conf** # more paths can be added for Dynamic Linker to look for shared libraries. After every change we run **ldconfig** to update **ld.so.cache**.

- **/etc/ld.so.conf.d/** # in modern system we don't edit **/etc/ld.so.conf** directly but instead we create **.conf** files under **/etc/ld.so.conf.d/**.

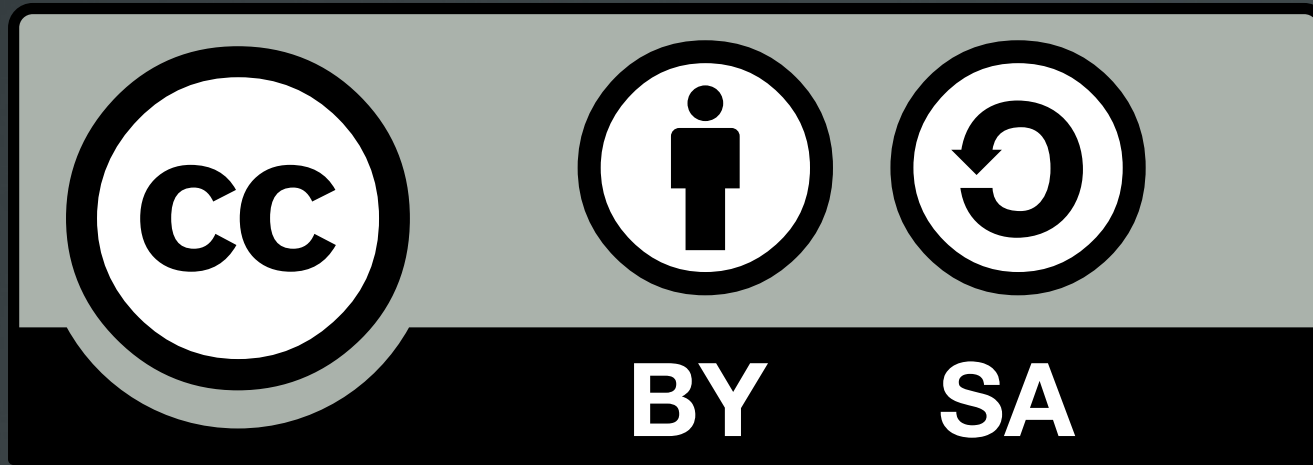# Update the *ld.so.cache* file with `ldconfig`

- **$ ldconfig -p** # show the contents of **ld.so.cache**.

- **# ldconfig** # read **ld.so.conf** and files under **ld.so.conf.d/** and push changes to **ld.so.cache**.

Options:

- **-p** # show shared libraries included in **ld.so.cache**

- **-v** # verbose view

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