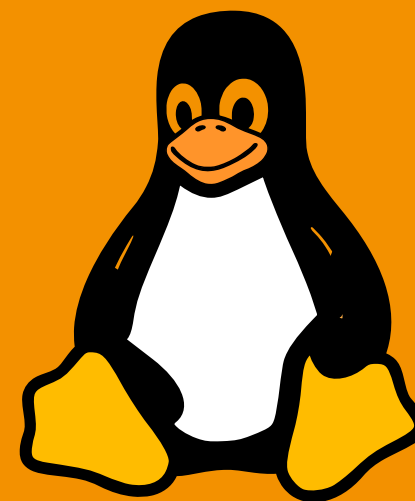




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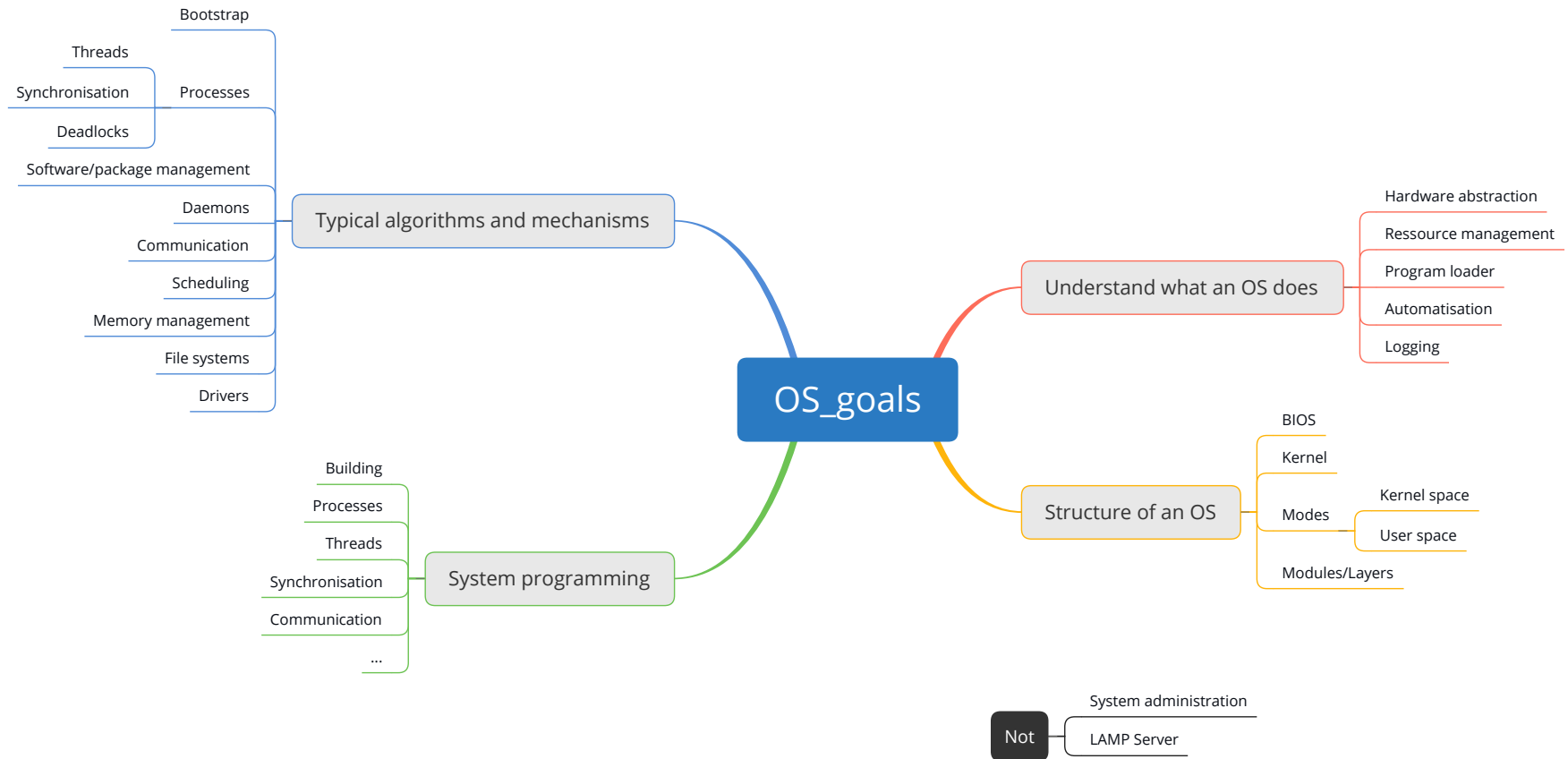
## OS 13 – Shared Libraries



source: [iconspng.com](https://www.iconspng.com)

The lecture is based on the work and the documents of Prof. Dr. Ludwig Frank

# Goal



# Goal

## OS::Shared Libraries

- Static library
- Shared library

# Intro

A lot of programs use the same  
libraries.

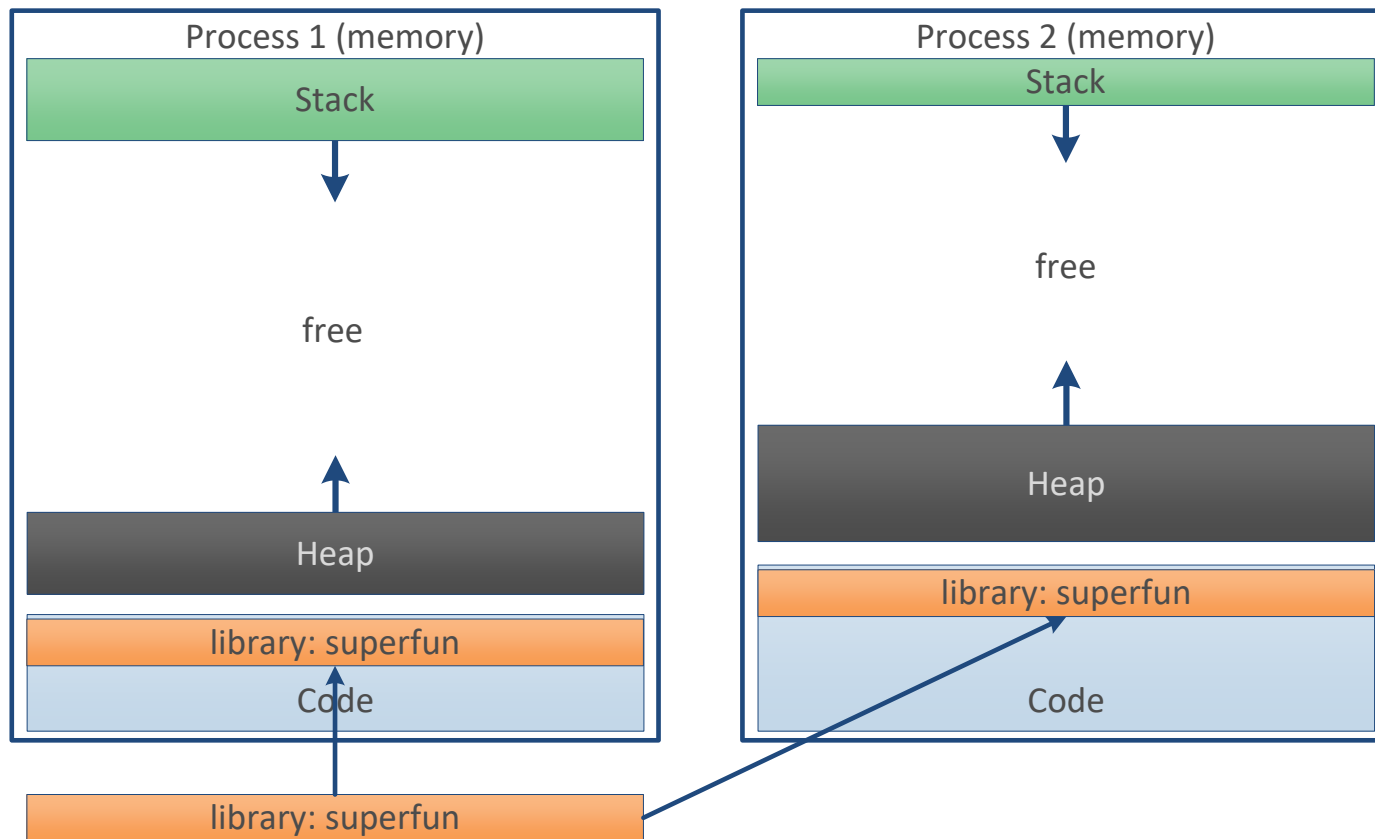
Is there a problem with that?

# Static library

## Intro into static libraries (\*.a)



# Visualisation of static library usage.



Everyone has the same code in its ELF: waste of memory!

# Static library

**Compile** sources of library superfun (dir: <sources>/lib):

```
1 gcc -c -o functions.o functions.c
```

**Create** static library (\*.a = archive):

```
1 ar rcs libsuperfun.a functions.o
```

**Link** against static library (dir: <sources>):

```
1 gcc -o program main.c -I./lib -L./lib -lsuperfun
2
3 #-I -> include directory for headers
4 #-L -> include directory for non system libraries
5 #-l -> link against library (whithout preceding lib*)
```

**Execute** program:

```
1 ./program
```

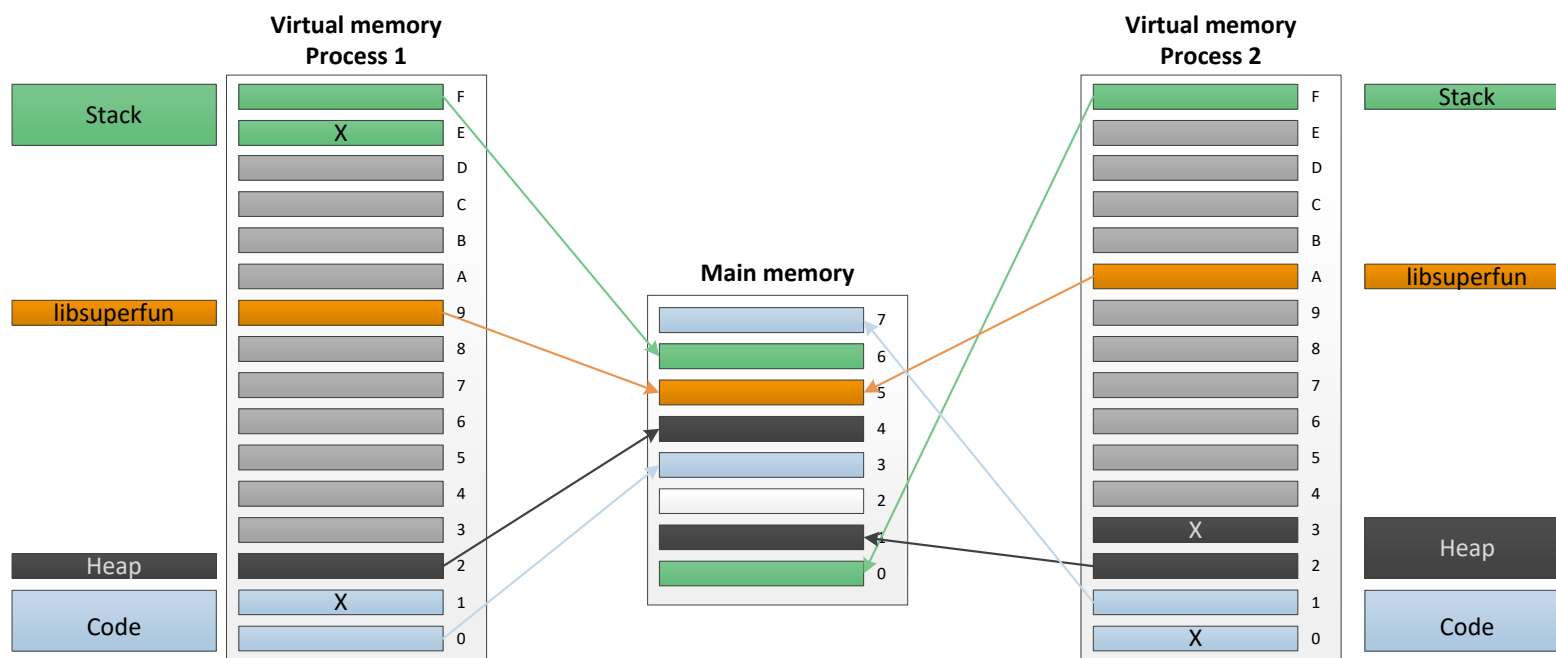
# Shared library

## Intro into shared libraries (\*.so)





# Visualisation of shared library usage.



Everyone loads the same code but on a different location in its virtual memory. **The library is only once in the main memory.**

# Shared library

**Compile** sources and create shared library superfun (dir: <sources>/lib):

```
1 gcc -fPIC -shared -o libsuperfun.so functions.c
2
3 #-fPIC    -> create position independent code
4 #-shared  -> create a shared object (usual. linked by executables)
```

**Link** against shared library (dir: <sources>):

```
1 gcc -o program main.c -I./lib -L./lib -lsuperfun
2
3 #-I -> include directory for headers
4 #-L -> include directory for non system libraries
5 #-l -> link against library (whithout preceding lib*)
```

**Execute** program:

```
1 LD_LIBRARY_PATH=$(pwd)/lib ./program
2
3 #LD_LIBRARY_PATH -> additional path for non system shared libs
```

# Summary and outlook

## Summary

- Static library
- Shared library

## Outlook

- User management