The Nanvix Operating System

Overview

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The Nanvix Operating System

Project Overview

- Created from scratch for educational purposes
- Designed to be small, simple, modern and fully featured
- Publicly available under the GPL v3 license at:

www.github.com/ppenna/nanvix

Pedro H. Penna
UFSC

Davidson Francis
PUC Minas

Subhra Sarkar
EchoStar Corp.

Figure: People involved in the Nanvix Project.

The Nanvix Operating System

Kernel Features

- POSIX compliant system call interface
- Unix System V architecture
- Non-preemptive kernel
- Time-sharing
- Multiprogramming
- Interprocess communication
- Virtual memory with swapping
- Minix file system
- Uniform device interface

The Nanvix Operating System

User-Land Features

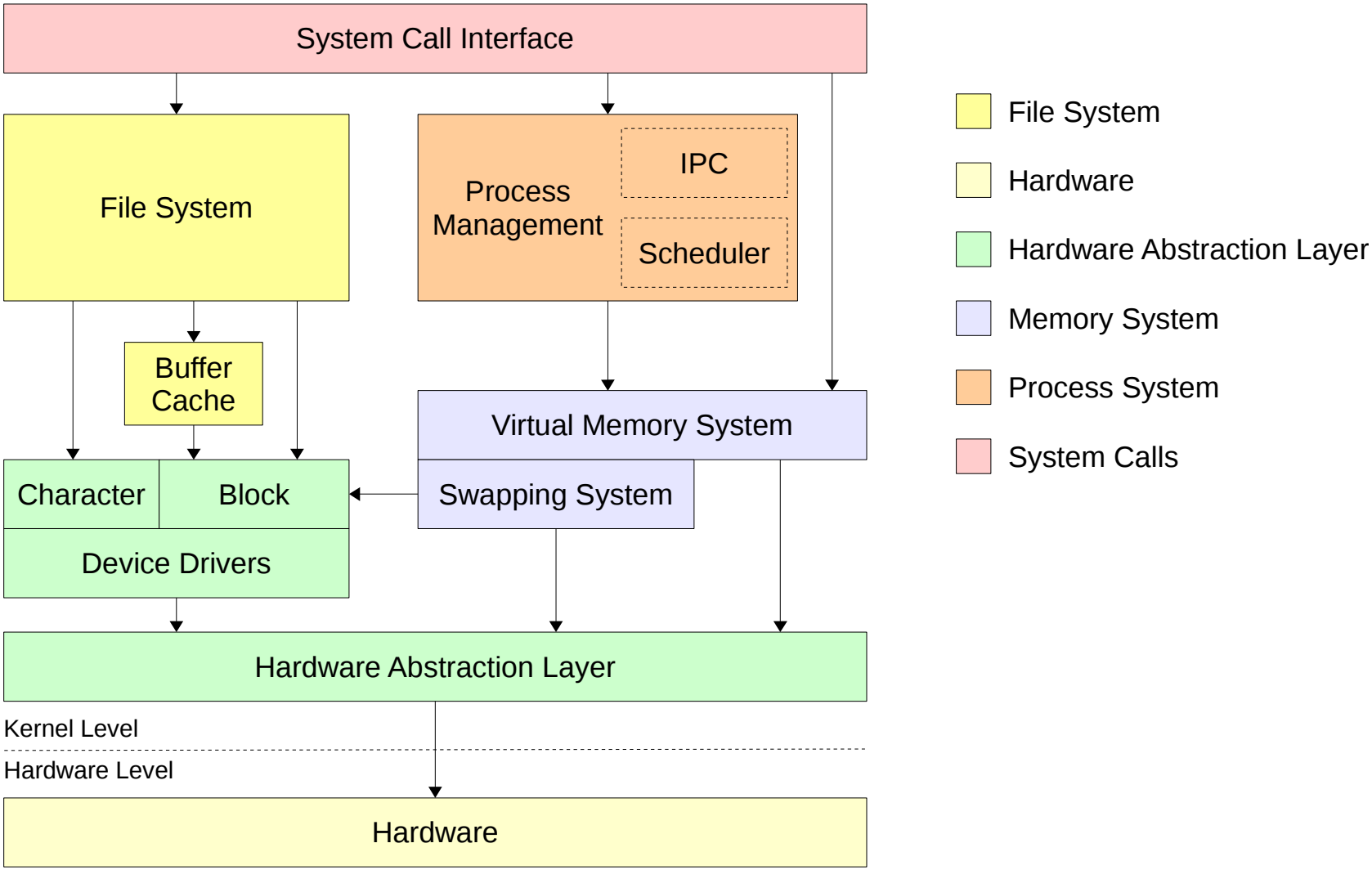
- Standard C Library
- Unix-Like utilities

```
Nanvix - A Free Educational Operating System

The programs included with Nanvix system are free software
under the GNU General Public License Version 3.

Nanvix comes with ABSOLUTELY NO WARRANTY, to the extent
permitted by applicable law.

Copyright(C) 2011-2016 Pedro H. Penna   <pedrohenriquepenna@gmail.com>
                       2015-2015 Davidson Francis <davidsondfgl@gmail.com>
                       2016-2016 Subhra S. Sarkar <rurtle.coder@gmail.com>

# echo "Hello World"
"Hello World"
# ps
------------------------------ Process Status ------------------------------
NAME                PID    UID       PRIORITY    NICE    UTIME    KTIME      STATUS
idle                0      0         40          20      0        4334       READY
init                1      0         40          20      1        0          WAITING
tsh                 2      0         40          20      0        1          WAITING
ps                  4      0         40          20      0        0          RUNNING

Last process: idle, pid: 0

#
```

Figure: Nanvix running.

The Nanvix Operating System

Kernel Architecture



The Nanvix Operating System

Source Tree

- `bin`: binaries

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- `doc`: documentation

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  - `include/dev`: device drivers headers
  - `include/fs`: file systems headers
  - `include/i386`: platform-specific headers
  - `include/nanvix`: kernel headers

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- `lib`: libraries
- `src`
  - `src/kernel`: kernel sources
  - `src/lib`: libraries sources
  - `src/sbin`: superuser utilities sources
  - `src/ubin`: user utilities sources

The Nanvix Operating System

Building Development Tools

- Build cross-compiler
  - GCC and GNU Binutils
- Build virtual machine with debug support
  - Bochs Emulator
- Required to build Nanvix properly

```
$ cd ~
$ git clone https://github.com/ppenna/nanvix
$ cd ~/nanvix
$ sudo bash tools/dev/setup-toolchain.sh
$ sudo bash tools/dev/setup-bochs.sh
$ sudo reboot now
```

The Nanvix Operating System

Building & Running

- Build the kernel
- Build user utilities
- Start Bochs and run Nanvix

```
$ cd ~
$ git clone https://github.com/ppenna/nanvix
$ cd ~/nanvix
$ make nanvix
$ sudo make image
$ sudo bash tools/run/run.sh
```