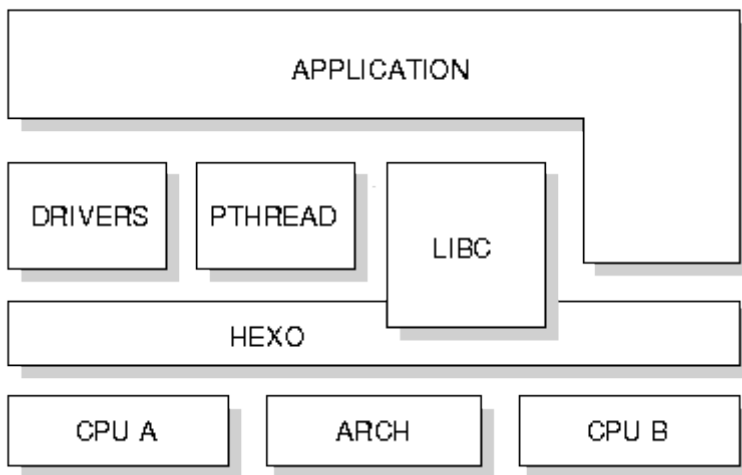


# MutekH as Unix process quick start guide

This guide explain how to run MutekH embedded in a Unix process. This is the simplest way to run MutekH as it doesn't require any hardware platform.

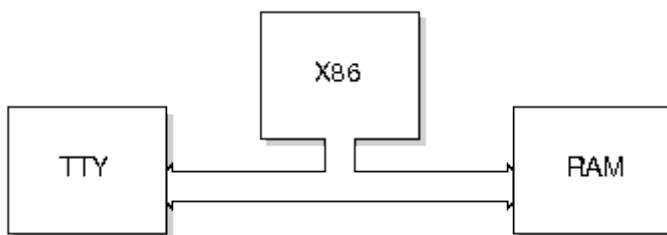
## Overview

The MutekH operation system is built on top of the Hexo hardware abstraction layer. It's composed of several modules and libraries.



When compiled to run embedded in a Unix process, minimal hardware ressource are needed: The host processor and unix process memory are used as execution platform and a simple TTY driver redirect output to the Unix terminal.

It enables running MutekH natively on the host processor. This configuration suffer from several limitations regarding available peripherals, but it is usefull to test and debug algorithms.



## Getting the sources

The example below show how to run MutekH using this configuration, it only requires to get the MutekH source code.

The MutekH source code is fully configurable and can be tweaked to adapt hardware platform and application needs. Configuration is handled by a dedicated tool which check dependencies and other relationships between the

large set of available configuration tokens.

```
svn co -r 1024 https://www-asim.lip6.fr/svn/mutekh/trunk/mutekh
```

Source tree is organized this way:

```
mutekh
|-- arch          contains hardware platforms modules for hexo
|-- cpu          contains processors modules for hexo
|-- doc          documentation
|-- drivers      device and filesystem drivers
|-- examples     Test and example programs
|-- gpct        container library, available as a separate project
|-- hexo        Hexo hardware abstraction layer
|-- libc        standard C library
|-- libm        standard math library
|-- libnetwork  network stack
|-- libpthread  posix thread library
|-- libvfs      virtual File System
|-- mutek       hardware independant kernel code
|-- scripts     build system scripts
`-- tools       some usefull tools
```

More directories are actually available with other libraries and features.

## Writing the example source code

Note: This example is available directly from `examples/hello` directory in source tree:  
`trunk/mutekh/examples/hello`

- Creating a new modules directory

```
mkdir hello
cd hello
```

- Writing the source code in `hello.c`

```
#include <pthread.h>

pthread_mutex_t m;
pthread_t a, b;

void *f(void *param)
{
    while (1)
    {
        pthread_mutex_lock(&m);
        printf("(%i) %s", cpu_id(), param);
        pthread_mutex_unlock(&m);
        pthread_yield();
    }
}

int main()
{
    pthread_mutex_init(&m, NULL);
    pthread_create(&a, NULL, f, "Hello ");
    pthread_create(&b, NULL, f, "World\n");
}
```

- Writing the Makefile

```
objs = hello.o
```

## Writing the MutekH configuration

### Standalone configuration file

Our configuration file is named `hello/config_emu`. Details about configuration file is explained later. This configuration file describe the following things:

- The application license, used to check license consistency for modules in use,
- The target hardware platform and processor
- Use of the POSIX threads library
- Use of terminal output
- Declaration of a new "hello" modules

The MutekH source code is split in modules. We now have to declare our new module to have it compiled along with the kernel by the build system. As modules may be located out of the source tree, we have to specify the module directory.

```
# New source code module to be compiled
CONFIG_MODULES examples/hello:%CONFIGPATH

# Application license
CONFIG_LICENSE_APP_LGPL

# Platform types
CONFIG_ARCH_EMU
CONFIG_ARCH_EMU_LINUX

# Processor types
CONFIG_CPU_X86_EMU

...
```

The complete configuration file is available here: `trunk/mutekh/examples/hello/config_emu`.

Have a look to the [BuildSystem](#) page for more information about configuration system and configuration file format. The [MutekH API reference manual](#) describes all available configuration tokens.

### Generic configuration file

The flat and standalone configuration file described above is specific to the target emu architecture, GNU/Linux host operating system and x86 32bits processor.

It's possible to write a more generic configuration file which relies on common files to target more platforms.

The complete generic configuration file is available here: `trunk/mutekh/examples/hello/config`.

## Compiling the application along with MutekH

Simply type something like:

```
make CONF=examples/hello/config_emu
```

or to use the generic configuration file:

Writing the example source code

```
make CONF=examples/hello/config BUILD=emu-linux-x86
```

The later allows targeting other emu platforms like MacOS X (darwin) and x86\_64 processors and other hardware platforms. See [BuildingExamples](#) for details.

Once the compilation process has finished, the executable binary is available.

## Execution

Simply execute the program as a normal unix executable:

```
$ ./kernel-emu-x86-emu.out
(0) Hello (0) World
(0) Hello (0) World
(0) Hello (0) World
(0) Hello (0) World
...
```

Other more advanced topics and guides are available from the [Main page](#).