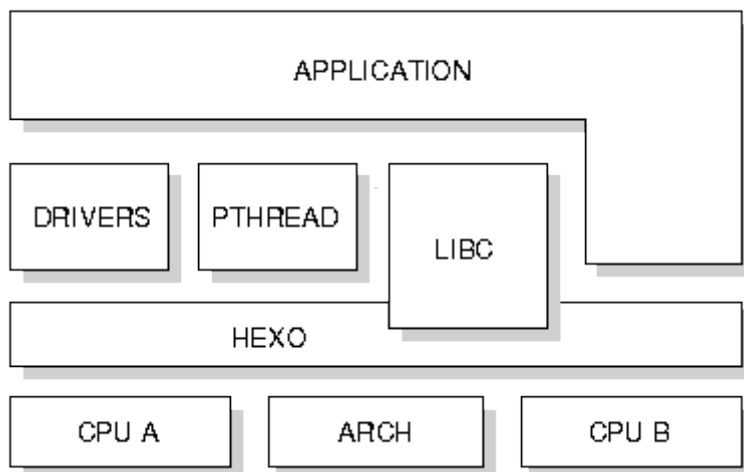


This guide explain how to run MutekH embedded in a Unix process. This is the simplest way to run MutekH as it doesn't require any hardware platform.

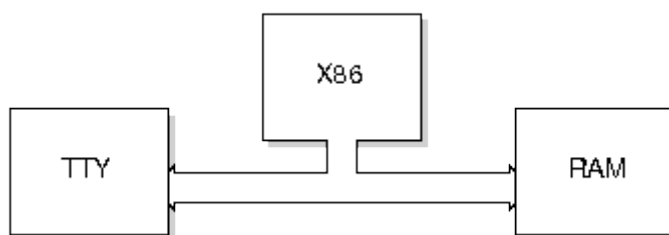
## Overview

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
|-- mutekh        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 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 files are available here: `trunk/mutekh/examples/hello/config_emu` and `trunk/mutekh/examples/hello/config_emu64`. You must choose the right one depending on your host operating system and architecture.

## Compiling the application along with MutekH

Simply type something like:

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

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

```
kernel-emu-x86-emu.out
```

## 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](#).