Introduction

MutekH is a free and portable operating system for embedded platforms, ranging from micro-controller to multiprocessor systems.

MutekH is very modular as it is ?exokernel based; it is composed of the Hexo hardware abstraction layer and the Mutek base kernel. The exokernel comes with several operating system interface libraries and services libraries. It was designed to be easily extended with new libraries and platform support, and allows development of kernel land and user land applications. It is fully configurable to match every application needs and platform constraints.

MutekH is currently used in several research projects, laboratories and universities and is actively developed. It was originally started at the ?SoC department of the ?LIP6 Laboratory (?UPMC in Paris). A list of major contributors is available here.

The MutekhManifesto page gives more details about project goals.

Software architecture

MutekH is composed of the following major components:

- The Hexo hardware abstraction layer which deals with processor and hardware platform abstraction and is capable of processor heterogeneity.
- The Mutek kernel which offer various usual kernel base features in a configurable manner.
- Some operating system interface libraries for kernelland or userland applications.
- Some kernel services libraries.
- Device and file system drivers.

Platform support

MutekH currently supports the following platforms:

- Soclib multiprocessor platforms with Arm, Mips32 and PowerPc processor support.
- Pc platform with x86 multiprocessor support, runs natively or on emulators like qemu.
- Simple platforms with single processor (i.e. micro-controller platforms)
- Unix processes emulation which enables kernel and application to execute natively, embedded in Linux or OsX process(es).

Getting started

Several documents are available to help you start using MutekH. You may also want to ?subscribe to the mutekh-users list.

- The BuildingExamples page briefly explains how to get a toolchain and build example applications.

- The MutekH as Unix process quick start guide is a step by step guide to run MutekH embedded in a GNU/Linux or MacOs user process.
- The MutekH/SoCLib tutorial is a step by step guide to write a simple MutekH application for a customizable Soclib multi-processor hardware simulator, intended for mixed software/hardware development.

- The MutekH quick start guide for SoCLib is a step by step quide to run MutekH over a complex SoCLib hardware simulator capable of processor heterogeneity, intended for kernel software developers.
- ?SoCLib provides a virtual machine image containing some sample platforms and applications based on MutekH.

More advanced topics are available:

- Using MutekH on a AT91SAM7 Arm micro-controller based platform.

Modules overview

Several modules are available:

- Base modules
  - Hexo HAL (hexo)
  - Mutek base kernel (mutek)
  - C library (libc)
  - Container library (gpct)
- Device drivers for various peripherals
- Parallel programming and Operating system interface libraries
  - Native Posix threads support (libpthread)
  - GNU OpenMP runtime library (libgomp)
  - A native implementation of ?Capsule parallel programming library. (libcapsule)
  - ?MutekS, a static OS for ?DSX SoC design tool (libsrl)
  - Unix library (development just started) (libunix)
- Major services libraries:
  - TPC/IP stack networking library (libnetwork)
  - File system support library (libvfs) along with file system drivers (FAT 16/32, ISO9660, RamFS, NFS)
  - ELF binary file format handling library (libelf)
  - Flattened device tree library (libfdt)
- Other useful libraries:
  - ?Lua scripting library (liblua)
  - ?Fdlibm standard math library (libm)
  - ?LibTermUI Ansi terminal driver and getline library (libtermui)
  - A simple cryptographic library (libcrypto)

Applications

MutekH is used in various projects, some successfully ported and well known applications include:

- H264 video decoder (multiprocessor)
- MJPEG and Theora video decoder (multiprocessor)
- ?Splash benchmarks.
- ?Doom video game with network support
- Various application using the ?Lua script engine

Documentation

Quickstart and tutorial documents:

- See Getting started section for start guides.
- Porting your application
- Using MutekH on a AT91SAM7
- Using the lua_microshell example

Developers documentation:

- MutekH API reference manual
- Writing header documentation for the API reference manual.
- Using the BuildSystem
- Adding a driver, or adding a new driver class
- using Flattened device trees to describe hardware.
- Usage of IntegerTypes in MutekH

Getting the source

Latest source code can be fetched from the subversion trunk:

```
svn co https://www.mutekh.org/svn/trunk/mutekh/
```

Contact

- A mailing list is available for questions, announcements... You may freely ?subscribe here.