µ111

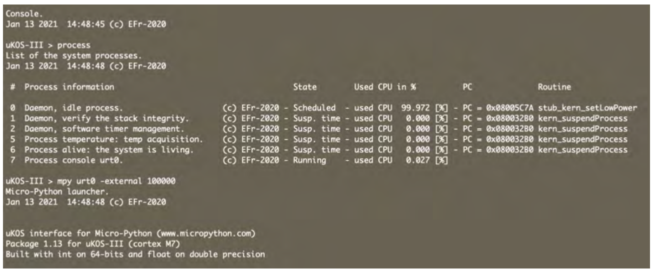
LowPower RTOS+OS for secured IoT applications

General description

The µ111 package is a collection of expandable software modules & tools. At the core of µ111 is the real-time µkernel; highly portable, scalable, preemptive, configurable, real-time, multitasking kernel for microprocessors, microcontrollers and DSPs.

Offering unprecedented ease-of-use, the µ111 package is delivered with complete 100% C99 source code and in-depth documentation. It runs on a large number of processor architectures, with ports examples available for download on request.

The µ111 package allows you to adjust your system's memory footprint based on your design requirements, saving valuable memory space. The Nano version is specially tailored to minimize the memory footprint suitable to be embedded in ASIC.



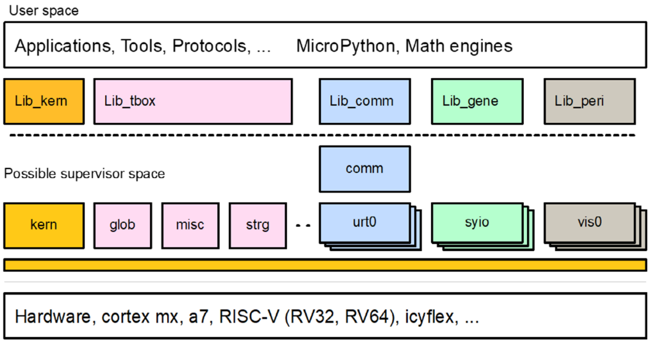
```
Console.
Jan 13 2021  14:48:45 (c) EFr-2020

uKOS-III > process
List of the system processes.
Jan 13 2021  14:48:48 (c) EFr-2020

 #  Process information                           State        Used CPU in %        PC               Routine

 0  Daemon, idle process.                     (c) EFr-2020 - Scheduled  - used CPU  99.972 [%] - PC = 0x08005C7A stub_kern_setLowPower
 1  Daemon, verify the stack integrity.       (c) EFr-2020 - Susp. time - used CPU   0.000 [%] - PC = 0x080032B0 kern_suspendProcess
 2  Daemon, software timer management.        (c) EFr-2020 - Susp. time - used CPU   0.000 [%] - PC = 0x080032B0 kern_suspendProcess
 5  Process temperature: temp acquisition.    (c) EFr-2020 - Susp. time - used CPU   0.000 [%] - PC = 0x080032B0 kern_suspendProcess
 6  Process alive: the system is living.      (c) EFr-2020 - Susp. time - used CPU   0.000 [%] - PC = 0x080032B0 kern_suspendProcess
 7  Process console urt0.                     (c) EFr-2020 - Running    - used CPU   0.027 [%]

uKOS-III > mpy urt0 -external 100000
Micro-Python launcher.
Jan 13 2021  14:48:48 (c) EFr-2020


uKOS interface for Micro-Python (www.micropython.com)
Package 1.13 for uKOS-III (cortex M7)
Built with int on 64-bits and float on double precision
```

Benefits

- Versatile **console-based** interface
- Console tools for **on-the-fly debugging**, analysis and software download
- Easy and **rapid porting** on new CPU / platform
- Allows to build secured and reusable applications
- **Rapid path** between off the shelf microcontroller boards and ASICs
- **Optimal usage** of the time and memory constraints
- Available sources with a **LTS license** (Long Term Support)
- Supported cores: Cortex-M0 -M0+ M3 -M4 -M7 -M23 -M33, RISC-V RV32 & RV64
- Ready ports: STM32xxx, Ambiq Micro Apollo2, ON Semiconductor RSL10, Canaan Kendryte K210, Nordic Semiconductors nRF5xx, GigaDevice GD32VF (other ports on demand)

Key specifications

- **Portable**: The µ111 µkernel runs on large number of processor architectures, such as ARM Cortex-Mx, RISC-V RV32 & V64, CSEM icyflex. It can take advantage from the user/machine spaces and from specific secure units such as MPUs
- **Scalable**: The µ111 µkernel allows for almost unlimited tasks and kernel objects. The kernels' memory footprint can be scaled down (Nano version) to contain only the features required for your application, typically ~6–10 KBytes of code space and ~1 KByte of data space
- **Reliable**: The µ111 package includes debugging features that reduce development time. The µkernel can provide extensive range checking (memory leaks, stack limits, etc.)
- **Efficient**µ111 µkernel can include valuable runtime statistics, making the internals of your application observable. Identify performance bottlenecks, and optimize power usage, early in your development cycle
- **Toolchain**. µ111 package is developed using full opensource tools. Supported compiler goes up to the latest gcc, but other proprietary tools could be easily adapted. All the building scripts are available for macOS, Window 10, Ubuntu


User space
Applications, Tools, Protocols, ...
MicroPython, Math engines
Lib_kern
Lib_tbox
Lib_comm
Lib_gene
Lib_peri
Possible supervisor space
comm
kern
glob
misc
strg
urt0
syio
vis0
Hardware, cortex mx, a7, RISC-V (RV32, RV64), icyflex, ...

Applications

- Wearables, connected sports & medical equipment
- Industrial & used in space applications
- Indoor localization
- Low power protocols management

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