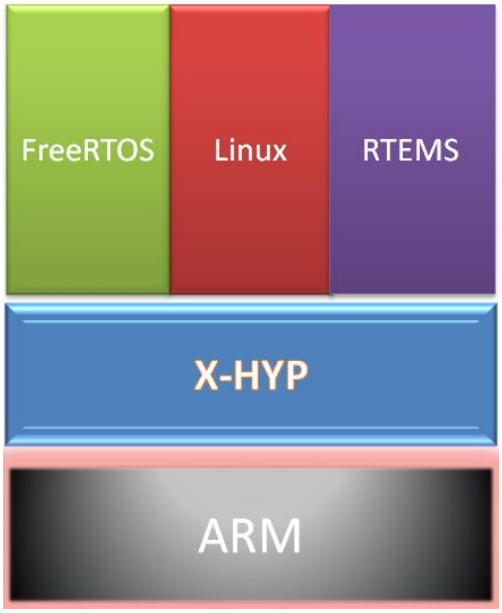
X-HYP

A realtime hypervizor for embedded systems



Typical use

Industrial - Avionics systems (ARINC 653), automated inspection, robotic applications, welding control.

Civilian - Automotive systems, elevator control, traffic light control.

Medical - Intensive care monitors, magnetic resonance imaging, remote surgery.

Multimedia - DRM protection, console games, home theaters, simulators.

X-HYP is a clean and simple realtime hypervizor to allow realtime virtualization inside embedded systems.

It lets you run multiple operating systems at the same time (It is highly optimized for and integrated with Linux) on a single platform while ensuring a hardware-based isolation between them.

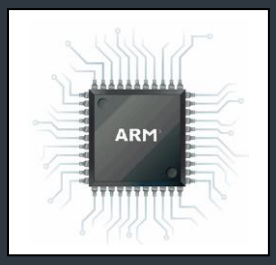
The number of Operating Systems can be run with the Hypervisor is only limited of RAM size. X-HYP has been designed to communicate via TCP/IP, and also features shared memory as a means of communication and synchronization between operating systems.

You can integrate your own RTOS or other real-time code into the X-HYP Hypervisor.

All operating systems running on the X-HYP are independent and may reboot any time without affecting others executing in parallel conforming to ARINC 654 standard.
Adoption of embedded virtualization allows device manufacturers to design a single solution that easily scales from low-core-count CPUs to high-core-count systems as processing needs dictate.

ARCHITECTURES

- ARM PROCESSOR



OPERATING SYSTEMS

- FreeRTOS
- RTEMS
- Linux
- uCOS

Technologies

Tour de l'Horloge
4, place Louis Armand
F-75012 PARIS
TEL 09 50 07 08 14
FAX 09 55 07 08 14
mnis@mnis.fr

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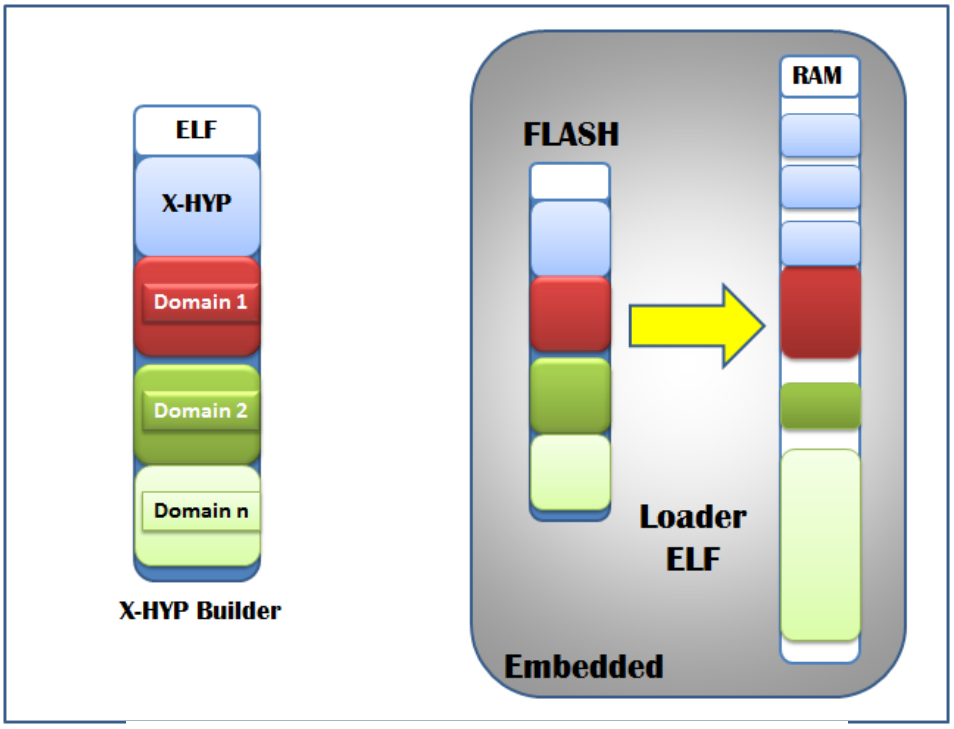

Integration of separate RTOS and GPOS

X-HYP is a clean and simple realtime hypervizor to allow realtime virtualization inside embedded systems.

- Using standard file format for a better integration with your development tools.
- Simple menu driven build tool for easy partitioning.
- ELF image including all partition, XHYP and XHYP driver partitions allows use of legacy boot loaders.
- Complete virtualization of cache handling for a real low latency domain switch and interrupt handling.
- Different class of real time scheduler available: EDF, ARINC, POSIX and Sporadic schedulers.
- Basic ARINC XOS interface.
- Para virtualized FreeRTOS available.
- Linux 3.8 available on demand.

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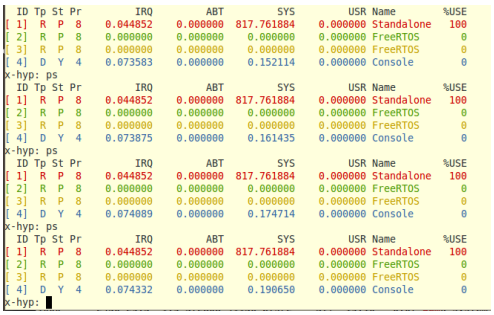
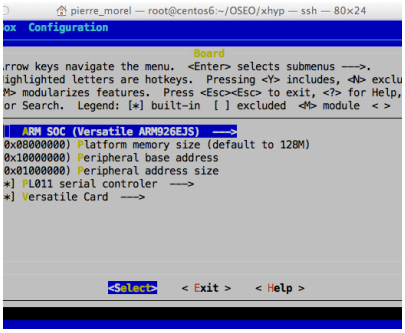


Example console output



Menu driven configuration

X-HYP proposes ready to use front end virtual drivers for new Operating System integration.

A serial console paravirtualized driver to allow each domain to log messages to a console.

Paravirtualized Ethernet interface card for the easy integration of TCP-IP

Paravirtualized SCSI interface for storage management.

In the picture above, the boot information of XHYP (black), followed by a simple XOS domain (red) and two independent FreeRTOS domains (green and yellow).

X-HYP provides virualization, partition scheduling and paravirtualized drivers for several often used architectures like:

ARMv5 architecture with a paravirtualization of ARM-926 with MMU and a complete demo on the Arm-Limited Versatile board.

ARMv7 architectures, supporting Cortex-A8 processor with MMU and trustzone

ARMv7 architectures with Cortex-M3 MPU

Different kind of domain scheduling and hypercalls interfaces

POSIX scheduling with 32 levels of priority aimed to handle a single RTOS and multiple GPOS.

ARINC scheduling with predefined schedule plans to handle multiple RTOS

EDF scheduling with cooperative EDF domains

X-HYP Builder Interface is flexible, easy to use and provides target files as standard ELF format.

Each domain is responsible to generate its own binary. All domains are accessing the same virtual memory addresses, allowing easy integration of new domain without changing existing domains. No domain can access real memory addresses belonging to other domains XHYP provides I.O. drivers based on a paravirtualization technic.

Each domain can integrate a front-end paravirtualized driver to access the services of the back-end driver domain.

Ready to use: FreeRTOS, Standalone
interface Planned: Linux, RTEMS, uCOS.
Ready to use platforms:
Versatile (ARM9), real view (Cortex-A8) platform port on demand.

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