

Introduction to StoMach

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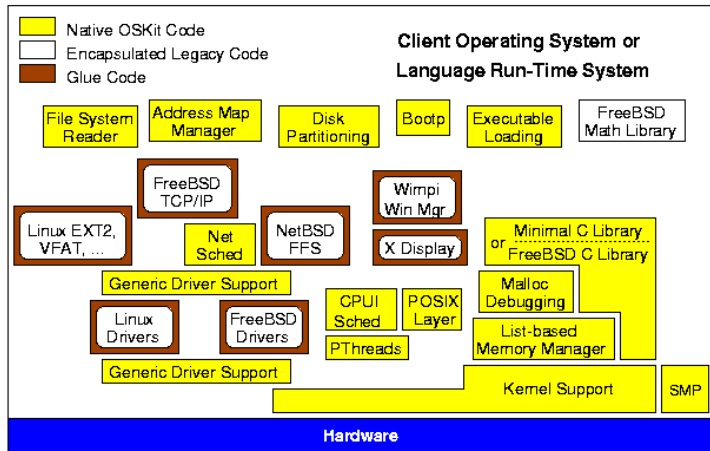
What is StoMach?

Born as personal branch.

Differences with GNU Mach:

- ▶ Removal of junk code.
- ▶ Empowering existing Mach's kernel interfaces.
- ▶ Substituting linux 2.0 glue code with OSKit Linux 2.2 drivers.

What is OSKit?



Brief History of StoMach

There are two versions of StoMach:

- ▶ tempura-stomach
 - ▶ First attempt to port OSKit drivers
 - ▶ OSKit and Mach in the same tree
 - ▶ Unformal, personal hack (offending printf's and such).
 - ▶ Very messy (lot of bugs).
- ▶ stomach
 - ▶ Second attempt.
 - ▶ StoMach and StoOSKit separate trees.
 - ▶ Polite printf's.
 - ▶ Code is cleaner.
 - ▶ Many things have been rewritten.

How to get StoMach

- ▶ You can get all released StoMach trees (included tempura-stomach) from <http://lugbari.org/~gianluca>
- ▶ New StoMach is available under a GNU Arch archive at <http://lugbari.org/~gianluca/arch/public>

```
glguida@gmail.com--lugbari--2005
```

```
stomach
```

```
stomach--mainline
```

```
stomach--mainline--0.0
```

```
base-0 .. patch-5
```

```
stomach--release
```

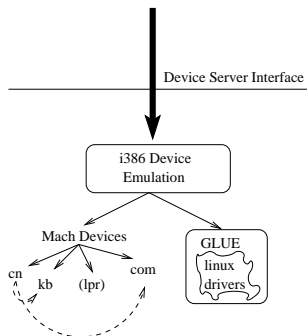
```
stomach--release--0.0
```

```
base-0
```

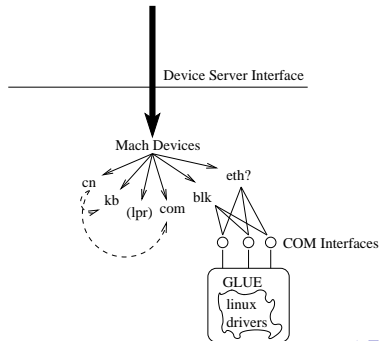
StoMach Guide Lines

- ▶ Use legacy architecture
- ▶ Make legacy architecture more powerful.
- ▶ Remove junk and unneeded legacy code.

GNUMach Device Drivers architecture



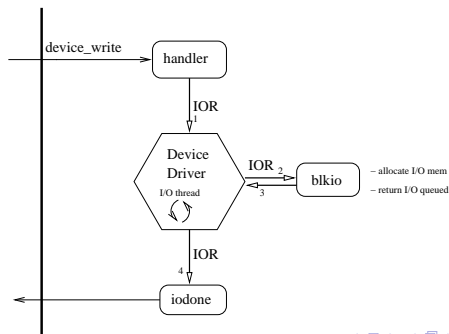
StoMach Device Drivers architecture



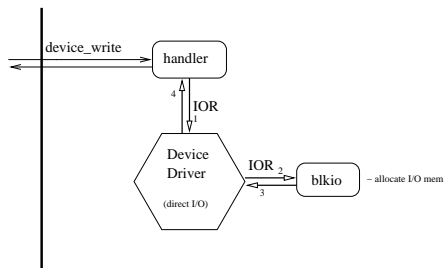
Example of Empowering Legacy Code 1/2

- ▶ blkio queueing mechanism.

Legacy Block I/O Mechanism



Direct Block I/O Mechanism



Example of Empowering Legacy Code 2/2

- ▶ Mach doesn't make difference between DMA capable and non-DMA capable memory.
- ▶ GNU Mach 1.x linux glue fixes this by suballocating fixed DMA-capable memory for all its needs.
- ▶ StoMach adds support for memory zones in `vm_resident`.

Stomach Changes

Current StoMach changes:

- ▶ Mach legacy code changes.
- ▶ Mach COM components
- ▶ OSKit Changes

Mach Legacy Code Changes 1/3

- ▶ Implemented architecturally independent memory zones.
 - ▶ i386 DMA Zone: $0 \leq x < 16 \text{ Mb}$;
 - ▶ i386 Normal Zone: $16\text{Mb} \leq x < \text{System Memory}$;

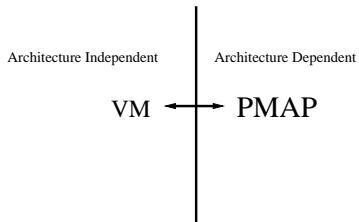
Allocation of DMA capable memory only is possible.
When allocating with no specified zone:

- ▶ Normal memory is tried.
- ▶ If no normal memory is free, alloc DMA memory.

PMAP \leftrightarrow VM module changed:

- ▶ New symbols exported by PMAP: *pmap_is_{dma,normal}*,
vm_page_{dma,normal}_{first,last}

VM and PMAP



Mach Legacy Code Changes 2/3

- ▶ Implemented contiguous pages allocation.
Legacy function – unused – existed. But incredibly slow.
PMAP ↔ VM module changed:
 - ▶ New symbols exported by PMAP: *pmap_phys_{start,end}*

Mach Legacy Code Changes 3/3

- ▶ Architecture dependend module to detect PCI bus and manage its registers.
- ▶ Added *dev_dynamic* support.

Mach COM components details

- ▶ COM components register and lookup functionalities.
- ▶ *components/*: Components exported by Mach for linking to OSKit.
- ▶ *blk/*: Linking between Mach drivers and block OSKit drivers.
- ▶ *eth/*: (not published ATM) Linking between Mach drivers and block OSKIT drivers.

OSKit changes in Sto-OSKit

- ▶ oskit_osenv_mem interface splitted in three parts:
 - ▶ oskit_osenv_kmem: small structure allocation in kernel memory.
 - ▶ oskit_osenv_vmem: big structure allocation in kernel virtual memory.
 - ▶ oskit_osenv_physmem: physical memory and low-level memory mapping functionalities.

StoMach todo and Future Works (?)

- ▶ Ethernet binding.
- ▶ Add SMP functionality.
- ▶ Make OSKit a generic framework for creating COM based drivers, with special section for legacy Linux 2.2 drivers.
- ▶ GNUMach 1.x can import StoMach legacy code improvements and make its glue better and less hairy too.

Gracias!

For more information, check <http://lugbari.org/> gianluca
or write to glguida@gmail.com .