

# Introduction to StoMach

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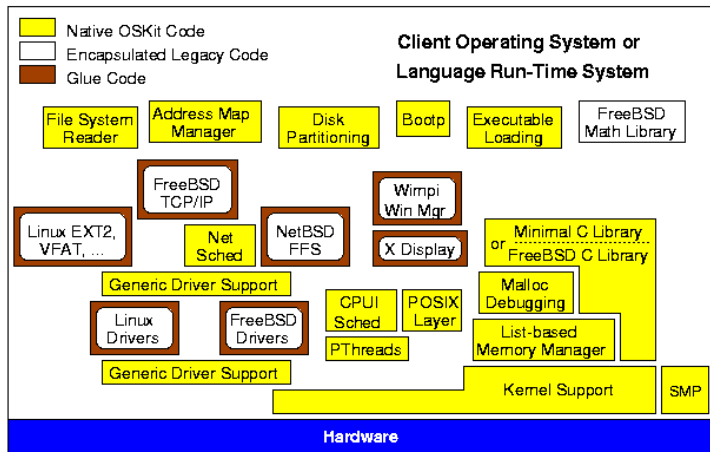
# What is StoMach?

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
```

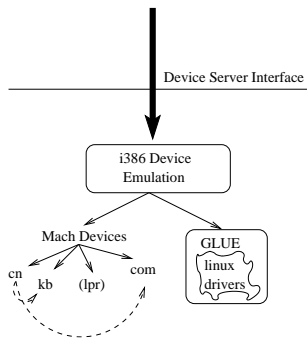
```
stomach--release--0.0
```

```
base-0
```

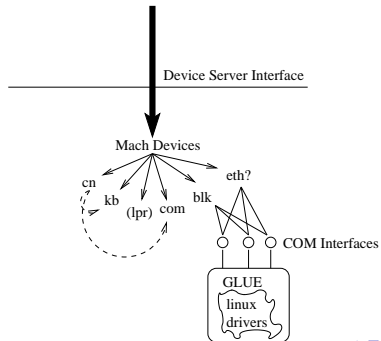
## StoMach Guide Lines

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

# GNUMach Device Drivers architecture



# StoMach Device Drivers architecture

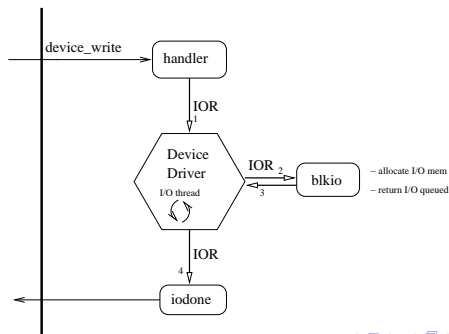




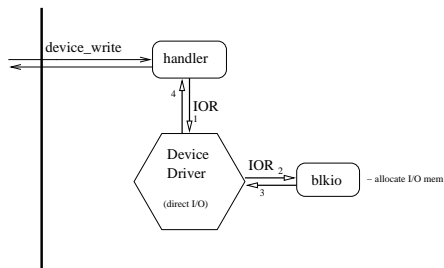
## Example of Empowering Legacy Code 1/2

- ▶ 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:  $16\text{Mb} \leq x < \text{System Memory}$ ;

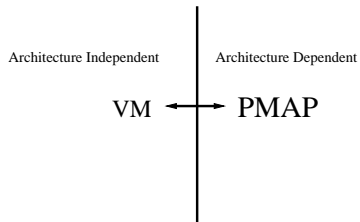
Allocation of DMA capable memory only is possible.  
When allocating with no specified zone:

- ▶ 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](mailto:glguida@gmail.com) .