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## Newconfig: A Dynamic Configuration Framework for FreeBSD

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## **Newconfig: a dynamic-configuration framework for FreeBSD**

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## **Overview**

- What is newconfig?
- Motivations
- Design
- Implementation
- Future work
- New-bus vs. newconfig
- Conclusion

## **What is newconfig?**

- Originally developed by Chris Torek in 4.4BSD.
- NetBSD, OpenBSD, BSD/OS
- We port this framework to FreeBSD-current

## **Motivations**

- PAO development
- CardBus support (hybrid of PCMCIA and PCI)
- There is no IRQ abstraction.
- There is no way to give configuration hint to PCI devices. (such as PCIC on PCI bus)

## Design

- A target is to merge to FreeBSD-current
  - ⇒ develop based on FreeBSD-current
- To implement dynamic configuration.
  - ⇒ add feature to handle kernel device driver tree dynamically.
- Support any drivers and any buses.

## Design (continued)

To remove old config ...

- Old auto-configuration mechanism appeared in 4.1BSD.
- config(8) is bus/machine dependent
- config(8) knows bus structure

## Design (continued)

Configuration hint and Plug-and-play bus

- No need configuration hint on PnP bus.
  - ... if every devices keep the PnP spec.
- Many rotten devices (or BIOSes).
- Device framework should provide "overriding" configuration hint.
  - ... or driver writers tend to "hard coding"

## Design (continued)

To support separation bus-dependent part

```
foo.c      foo driver core
foo_isa.c  foo driver ISA dependent part
foo_pci.c  foo driver PCI dependent part
```

**Experience** AMD 53C974 PCscsi controller.

⇒ 3-days by a beginner of driver programming.

## Design (continued)

Our idea of auto-configuration requirements:

1. Configuration hint information to device drivers
2. Bus/device hierarchy information
3. Inter-module dependency information
4. Device name → object file name mapping information

Newconfig handles all them, but static way.

## Implementation

`config.new(8)` reads 2 group of files

→ generate configuration data

→ statically linked to kernel

## Implementation (continued)

### 1. "files" file

- `/usr/src/sys/conf/files.newconf`
- `/usr/src/sys/i386/conf/files.i386.newconf`
- provided by programmer

### 2. CONFIG file

- `/usr/src/sys/i386/conf/NEWCONF`
- provided by user
- like "GENERIC", or "LINT"

## Future work

- Dynamic configuration for newconfig
- When are device configuration information given?
  - Compile time (static)
  - Boot time (a.k.a. UserConfig)
  - Run time (dynamic)
- The weakest point of the current implementation of newconfig.

## Future work (continued)

Implementation of dynamic config

- A utility that parse "files" file for dynamic module.
- A module loader with parsed "files" file and config hint.
- Kernel codes that handles loaded config information and registers new bus/device hierarchy.

## New-bus vs. newconfig

New-bus

<http://www.freebsd.org/~dfr/devices.html>

1. Configuration hint information to device drivers
2. Bus/device hierarchy information
3. Inter-module dependency information
4. Device name → object file name mapping information

## Conclusion

- Static vs. dynamic: both config required
- To provide the way of overriding PnP information
- Explicit syntax of configuration data are useful

## References

### newconfig information

<http://www.jp.freebsd.org/newconfig/>

### presentation draft

<http://home.jp.freebsd.org/~furuta/freenix/>