The universal PCI Express Device Driver for MTCA.4

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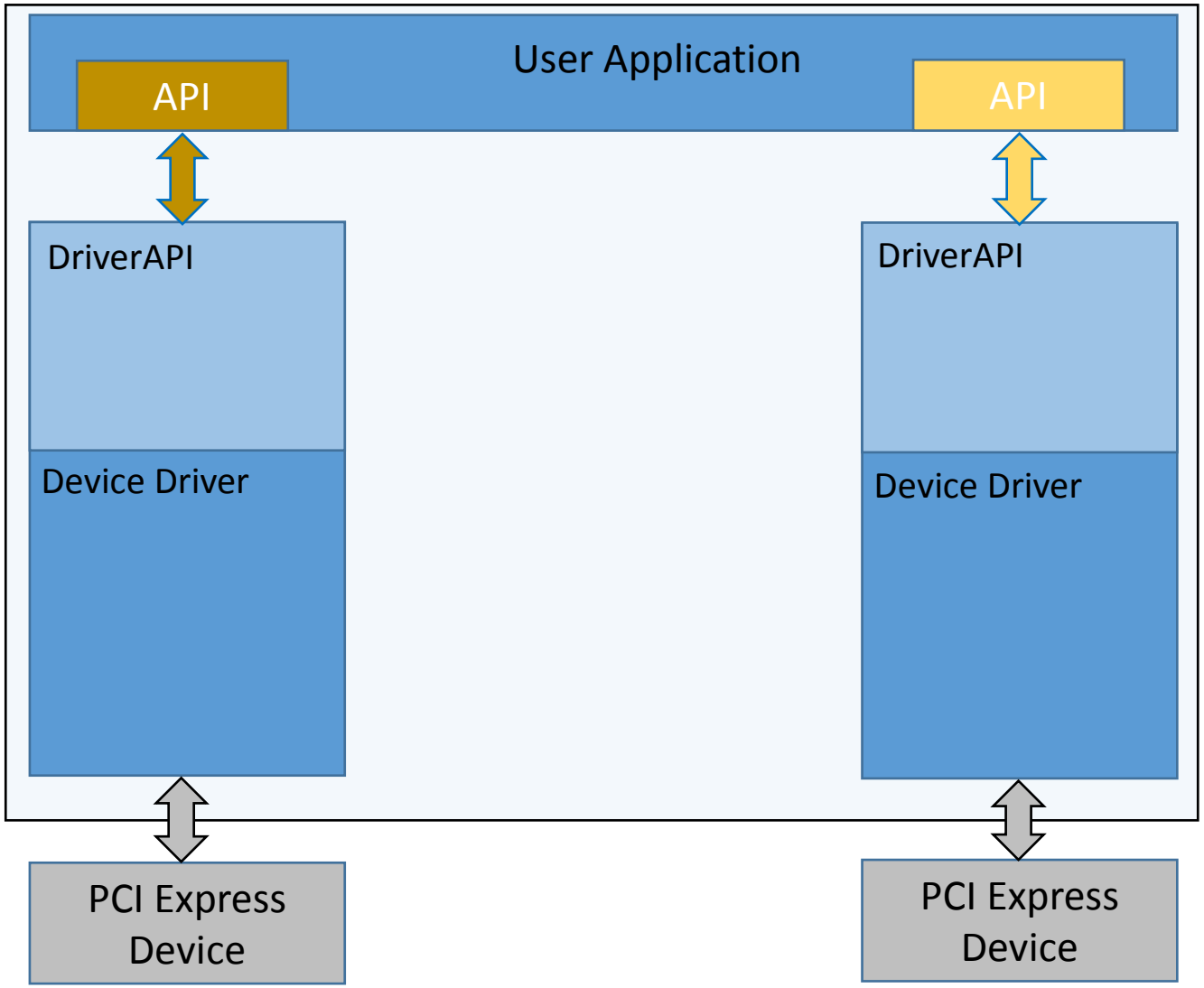
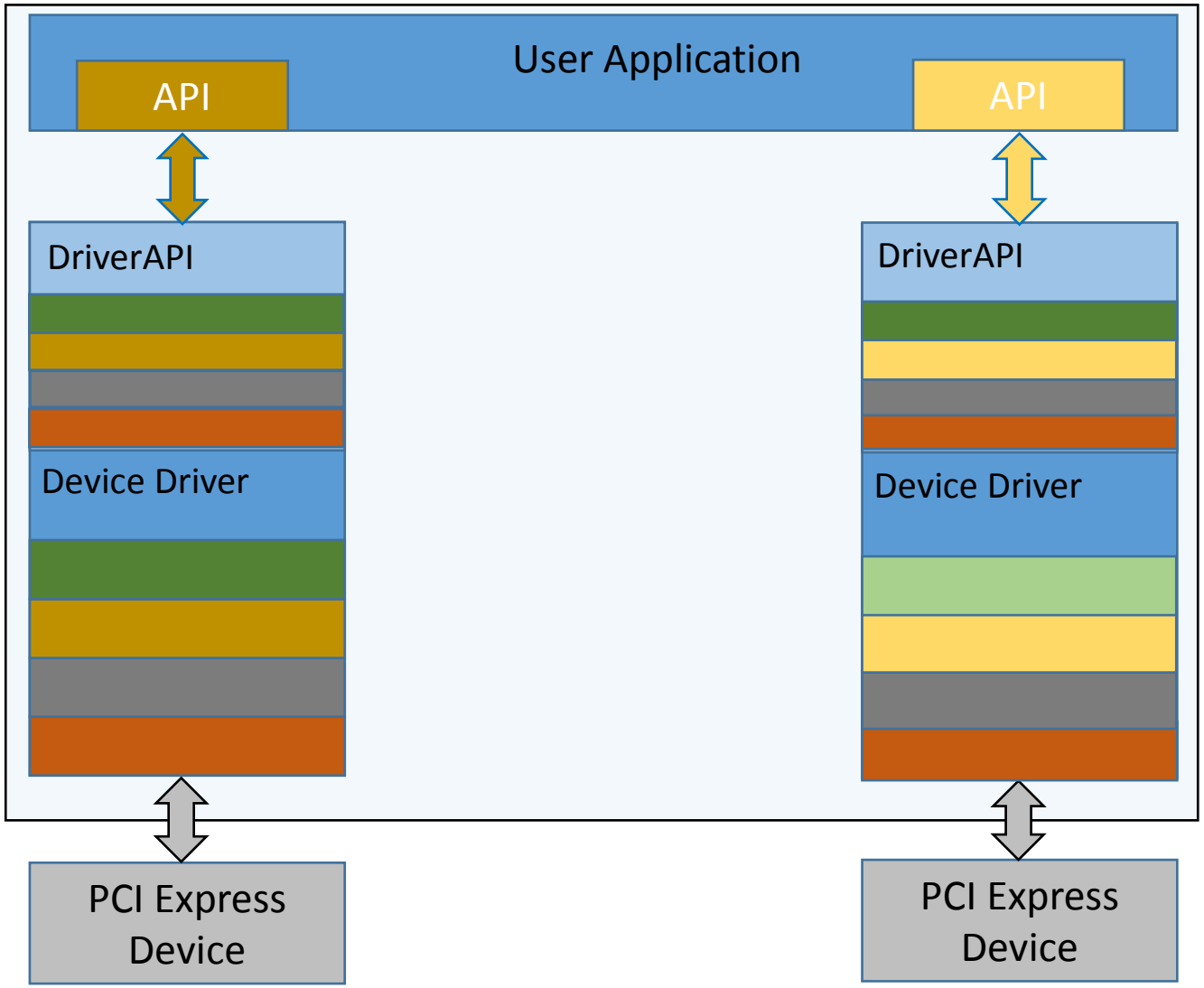
The Universal PCI Express Device Driver

- A Device Driver is loadable kernel Module that provides access to the particular device attached to a computer (PCI Express Bus)
- User Application use the Device Driver API to access to the Device
- More Devices -> More Drivers
- Different Drivers -> different APIs



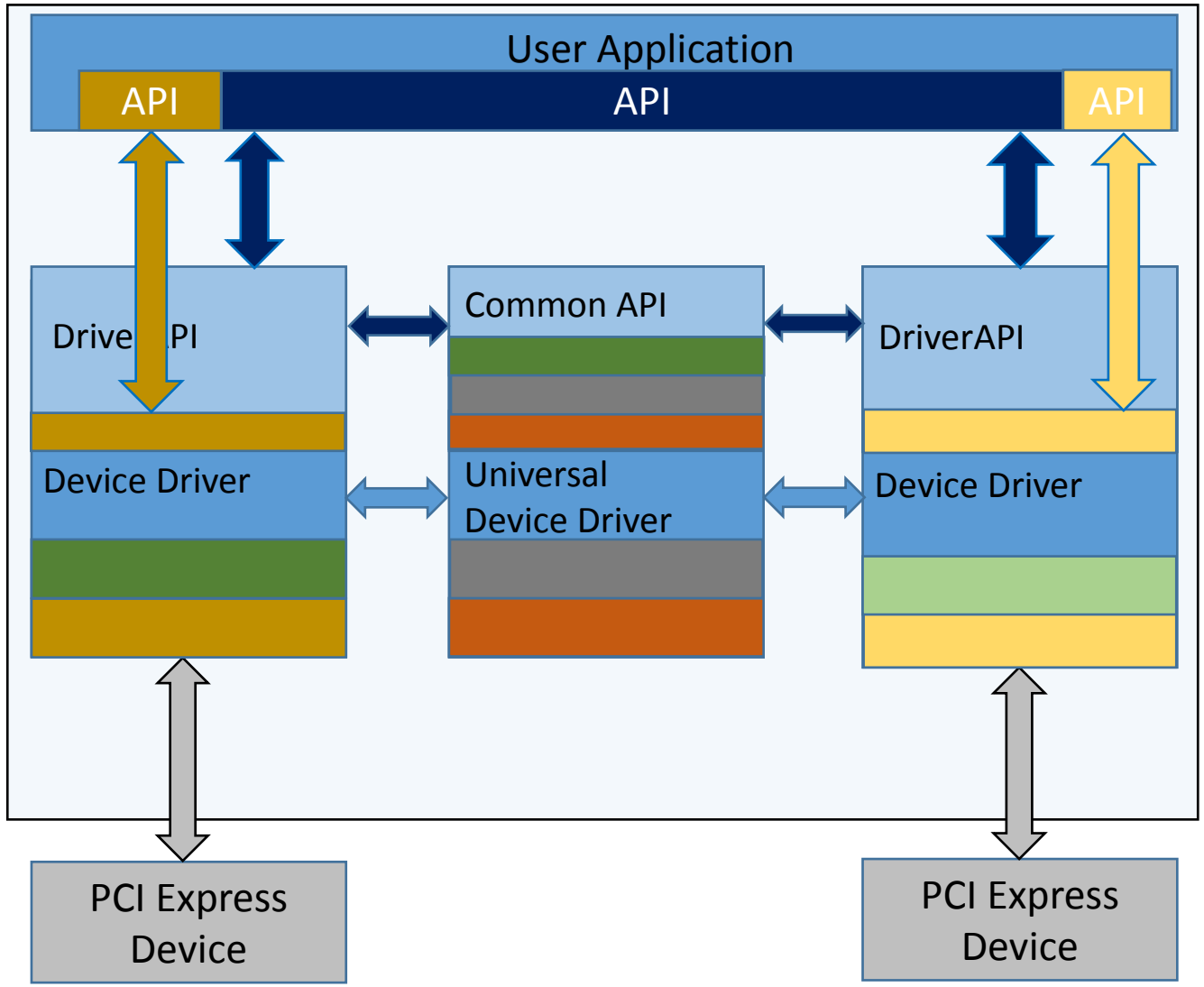
The Universal PCI Express Device Driver

- Basic PCI Express functionality
  - Mapping memories
  - **Read**, **write** and some common **ioctl**
  - Error handling
  - Hot Plug
- Standards or Guidlines functionalty
  - Standard Registers Set
  - SHAPI Registers Set (PICMG)
  - PICMG Standard Device Model
  - PCIe HotPlug functionality
- Device specific but has common API
  - DMA
- Device specific functionality



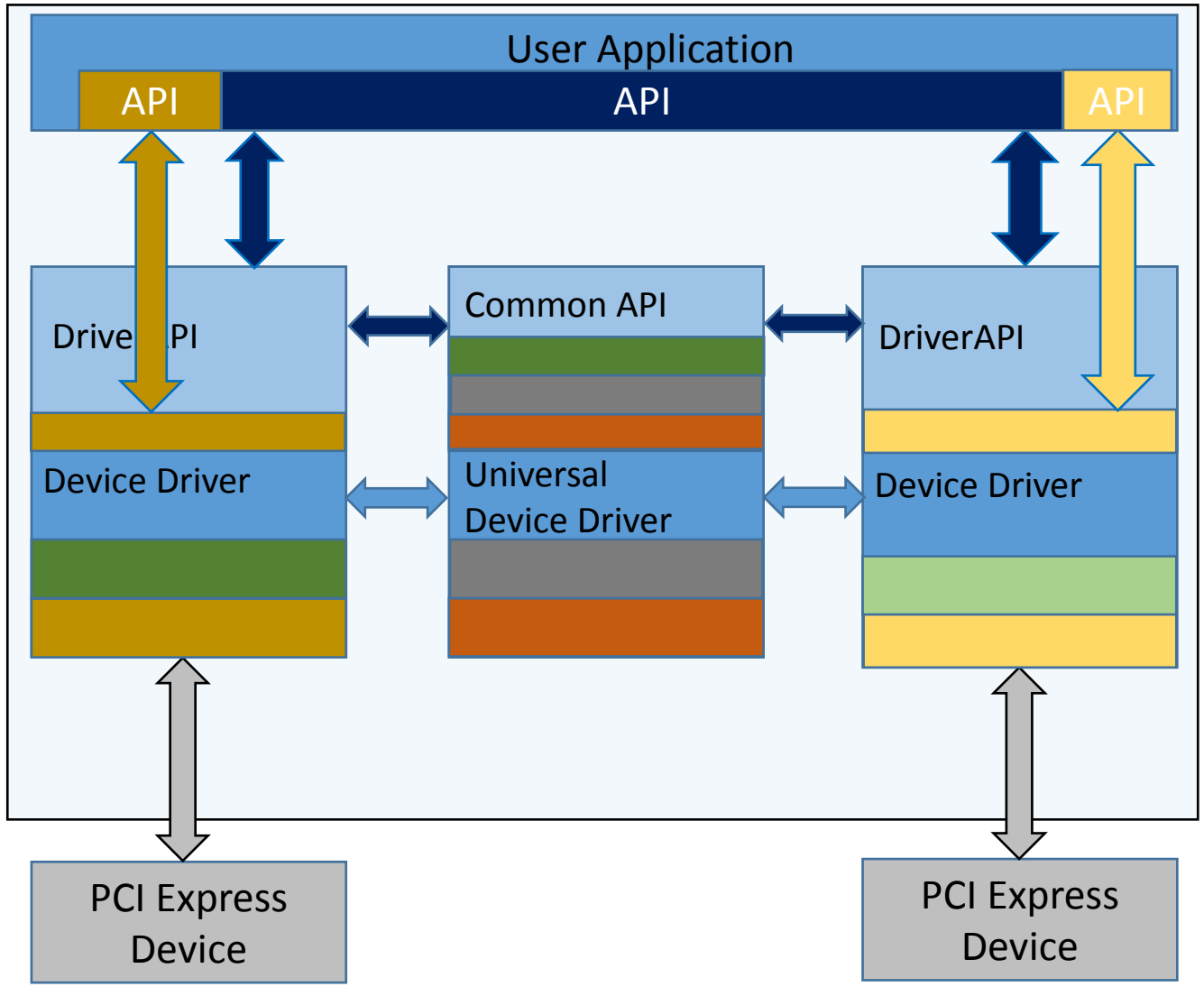
The Universal PCI Express Device Driver

- Split Device Driver into two parts follow the Linux Device Driver stacking Model
- Add all common functionality and API into universal part
  - Basic PCI Express functionality
  - Standards or Guidlines functionalty
- Add Common API for Device specific functionality into universal part but keep functionality in Device Driver side
  - Device specific but has common API



The Universal PCI Express Device Driver

- this approach facilitates creation of new drivers and user applications

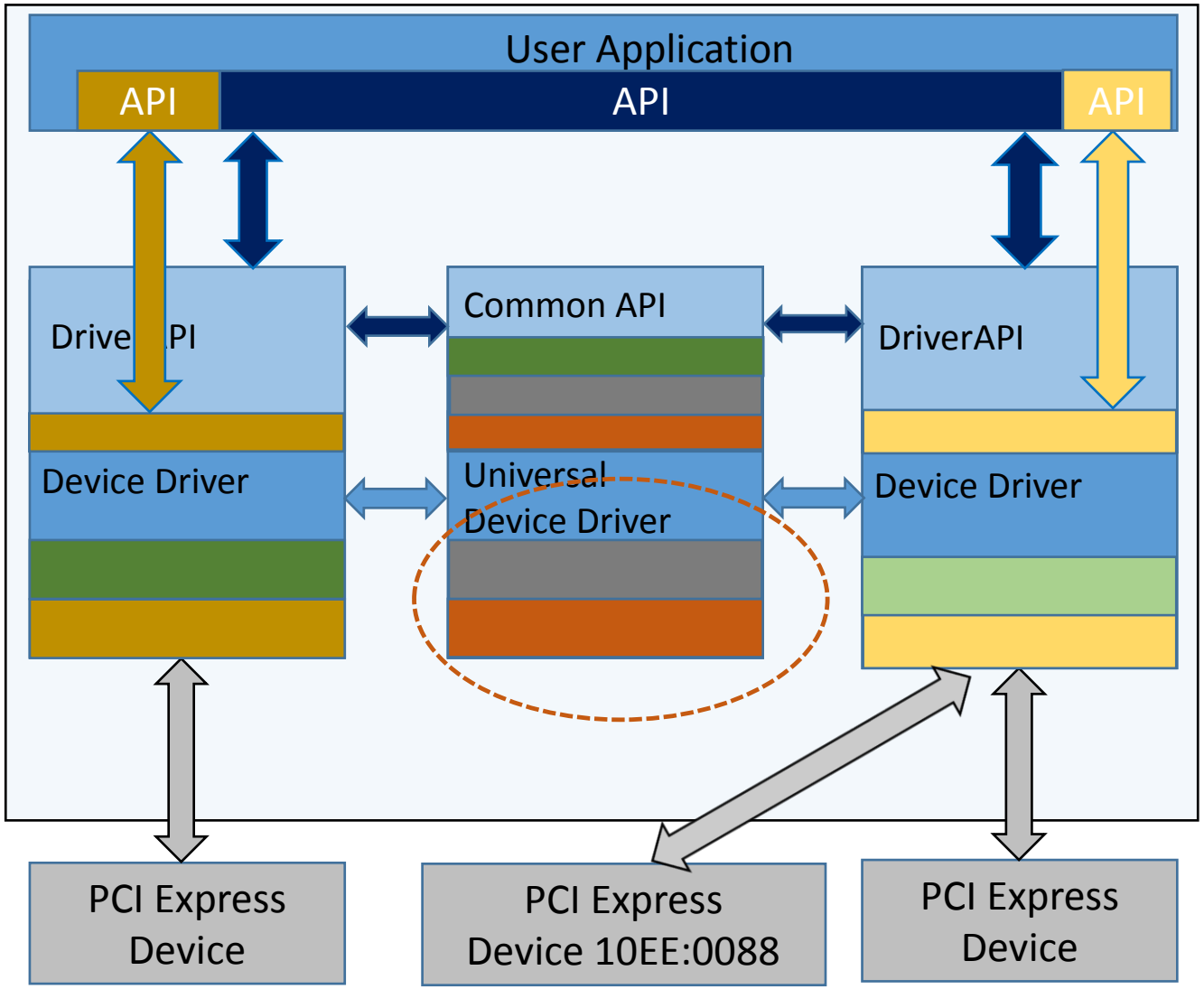


The Universal PCI Express Device Driver

- this approach facilitates creation of new drivers and user applications
- The Device Driver created on the top of ***universal*** driver has all necessary PCI Express functionalty
- It could be binded to any PCI Express Device

echo „10EE:0088“ > /sys/bus/devices/xxx/driver/new_id

facilitates integration of new devices into the existing software



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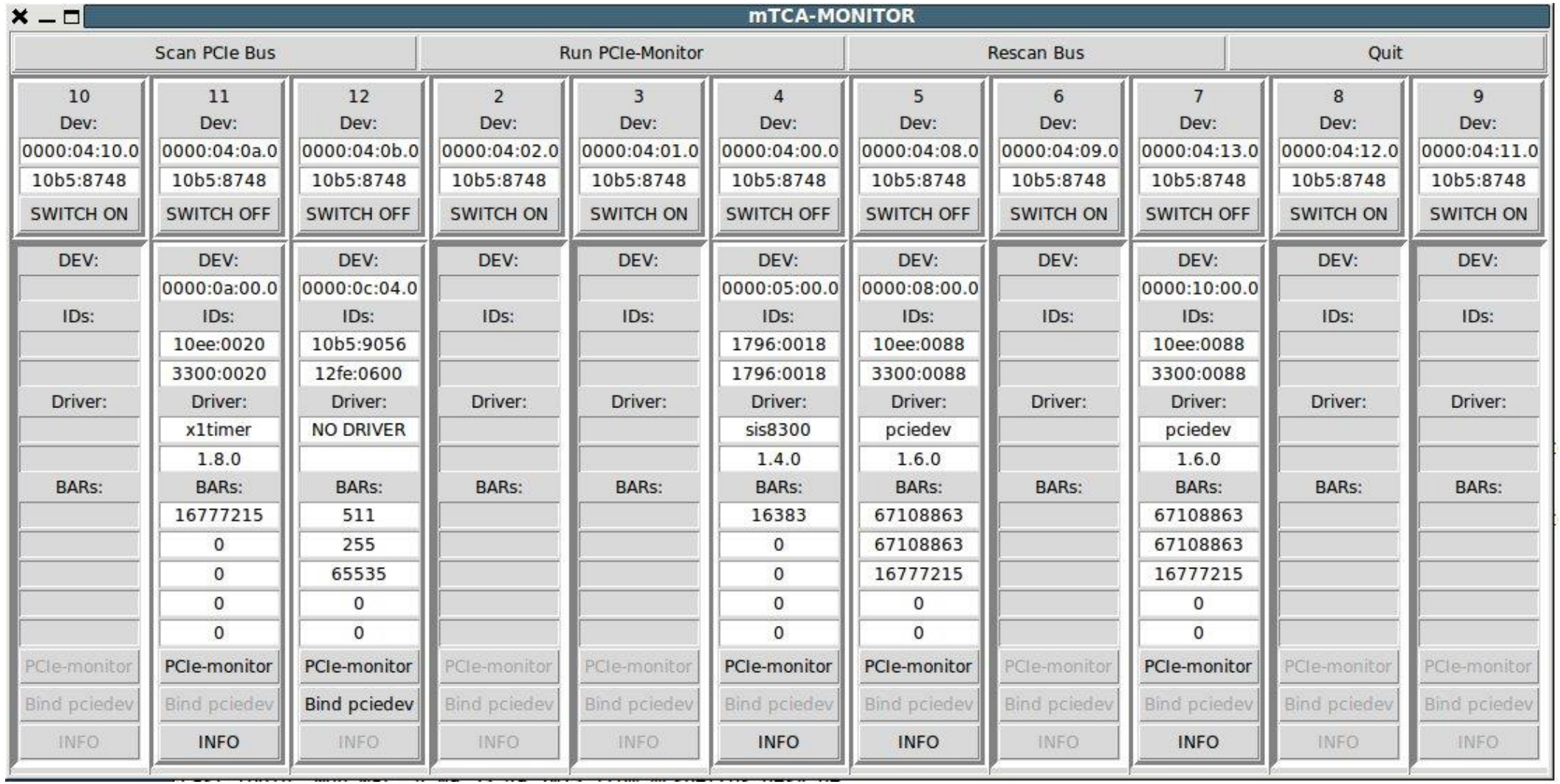

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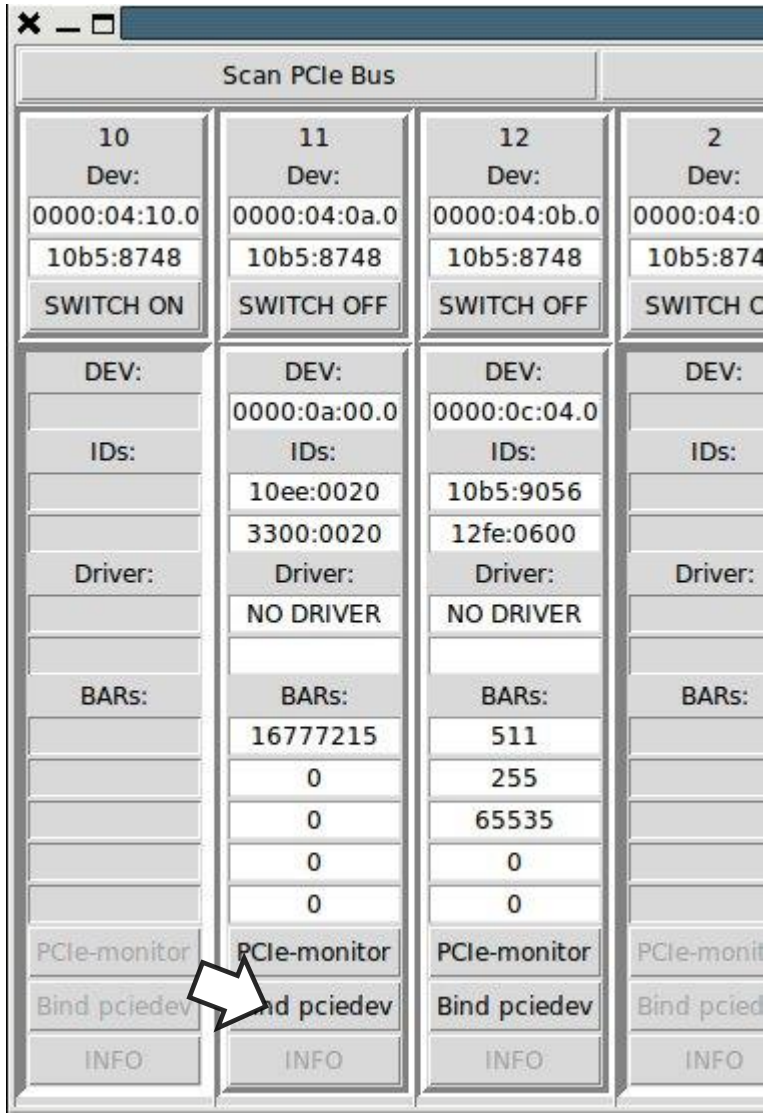

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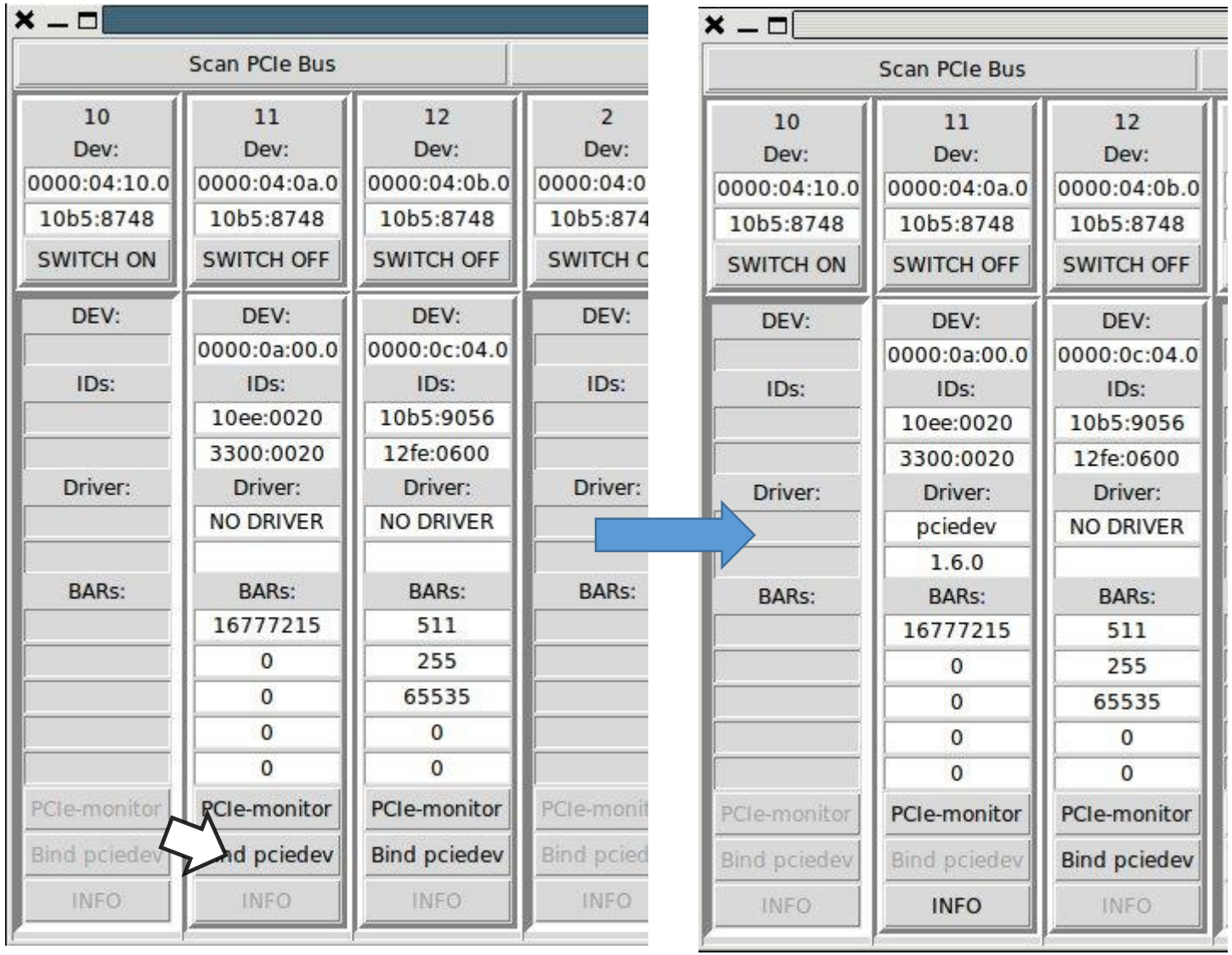

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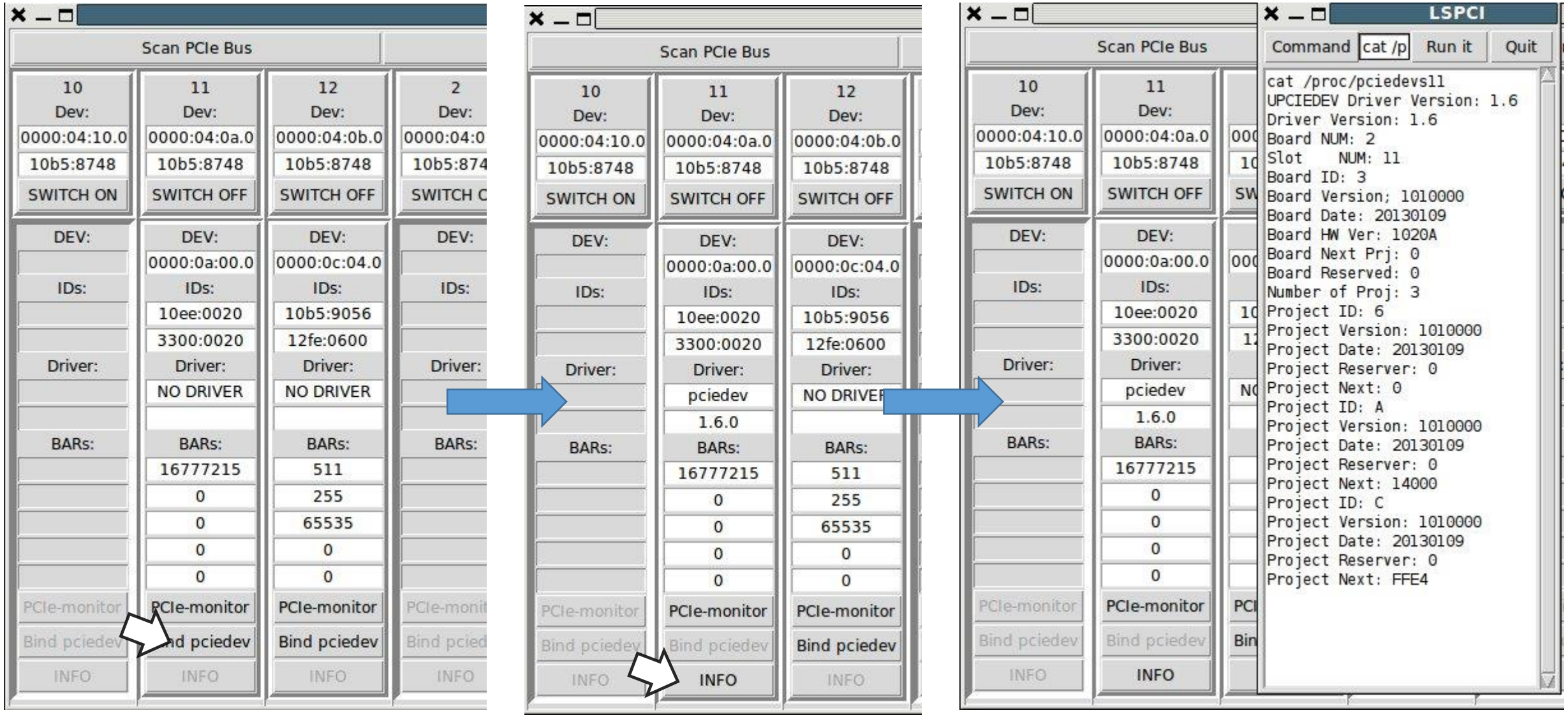

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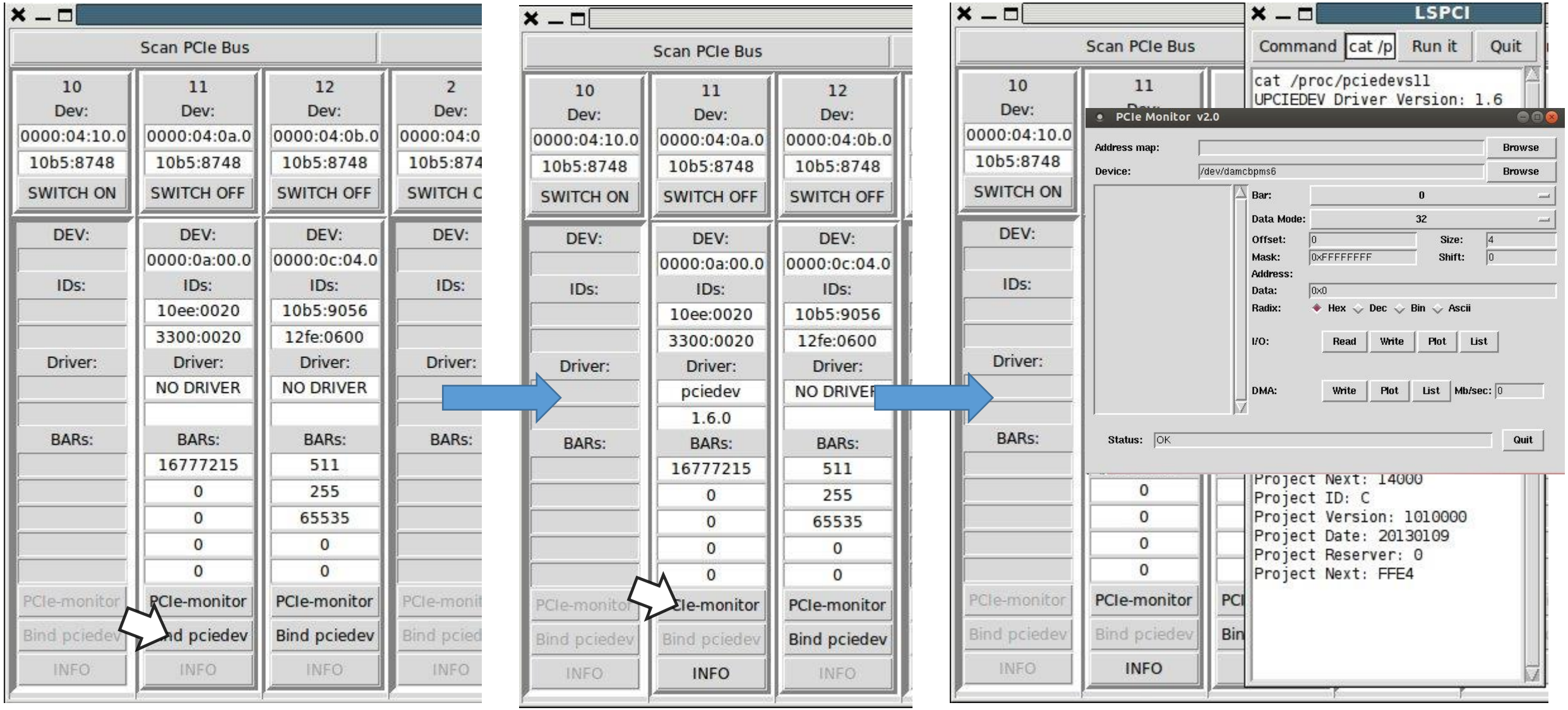
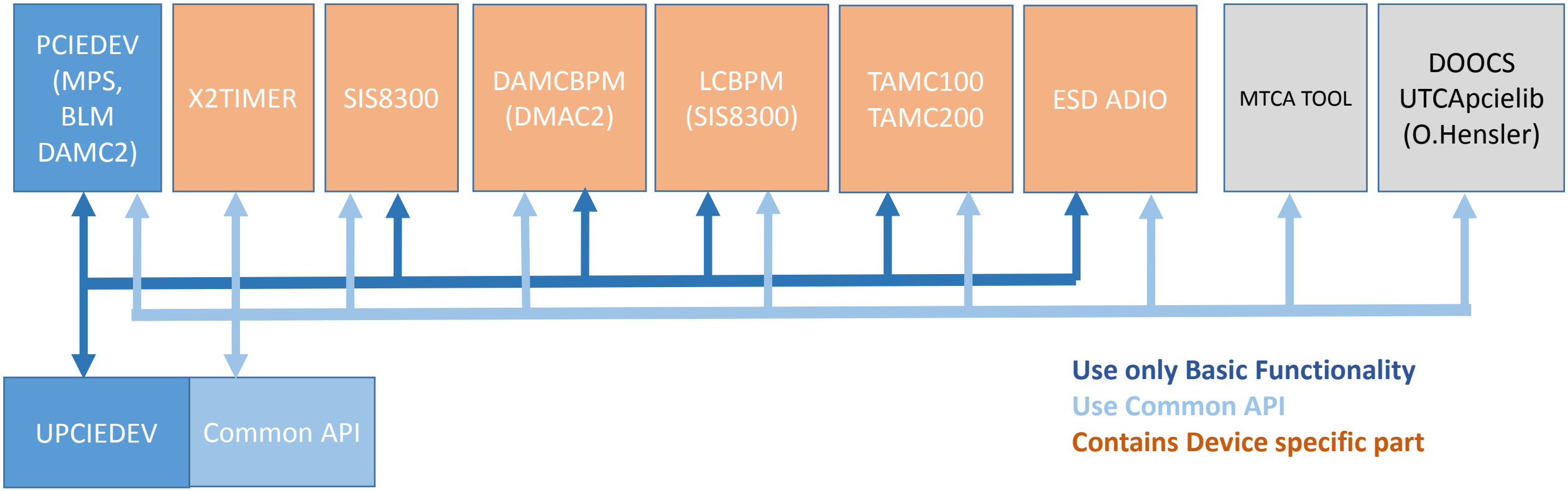


Status

- this architecture was developed in DESY group MCS4 and till today with success is used
- the following drivers, tools and libraries are developed used



Plans

Add more functionality to the universal driver

- More PCI Express specific tasks (PCI Express Error Handling, Transaction Ordering ...)
- Hide more Linux Kernel calls in the universial driver (top level driver does not depend on Kernel Version)
- Code cleaning, better documantation
- ...

Info

- All sources of the Drivers and Libraries are Open Source
- The source codes can be found on a DOOCS web page ***http://doocs.desy.de***
  - Go to *Source Code Repository*
    - ***source/unixdriver/utca/linux/upciedev*** and ***pciedev*** (all others as an example)
    - ***source/UTCApcielib***

- The packages can be download from ***http://doocs.desy.de/pub/doocs/***
- Mail ***doocs@desy.de***

THANK YOU