Let’s Hot plug:

By uevent mechanism in DPDK

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Agenda

- Hot plug overview
- what we have & why uevent ?
- Uevent mechanism introduction
- Uevent in virtualization
- Open and plan
- Q & A

Hot plug tech

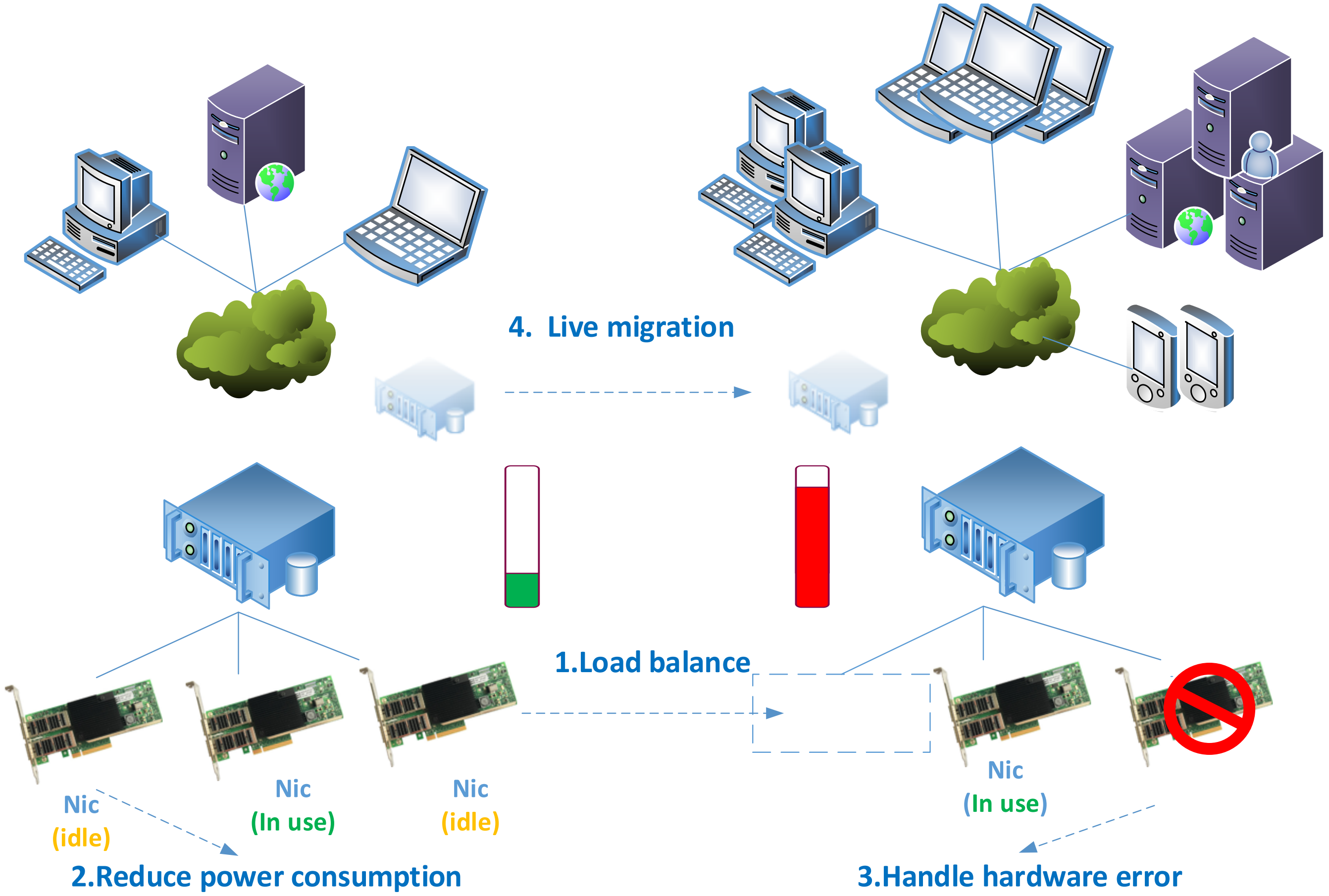
- Hotplug is a technology, which lets plug in a devices when system is running and use them immediately. While lets unplug a device but not affect the system running.
- HW support(etc. new IA platform), OS support(etc. linux), driver support(etc. OFED)
- Kernel >= linux 2.6, pciehp, port service like
- Management: BIOS -> ACPI.
- Hot-insertion and hot-removal.
- Non surprise hot plug and surprise hot plug.

Hot plug user case

- Load balance
- Reduce power consumption
- Handle hardware error

  (fail over or fail safe)
- live migration

For 24/7 availability, don't take it down for any reason!



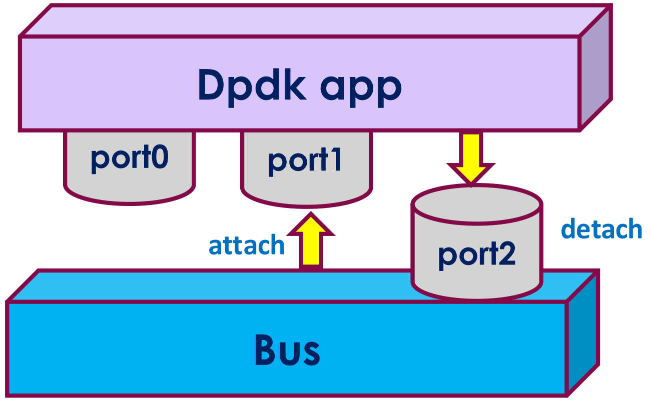
what we have.

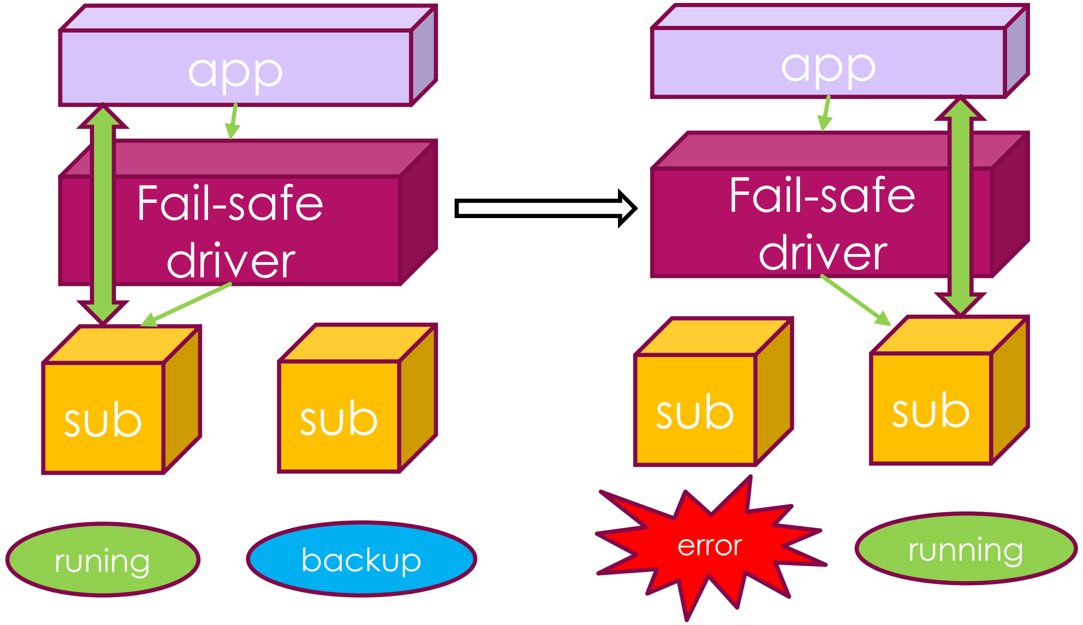
- General Hot plug API

  hot plug add / remove,

  dev_attach / dev_detach,

  Port plug in & out





- Fail-safe driver

  like an app helper,

  Manage sub device and process hot plug event,

  dynamic switch fail device to safe device.

why uevent ?

- Currently , device plug & play by plan, it need stop/close port before detach,

  It would be mass in cloud. And when attach port, need app knowledge the pci device id.

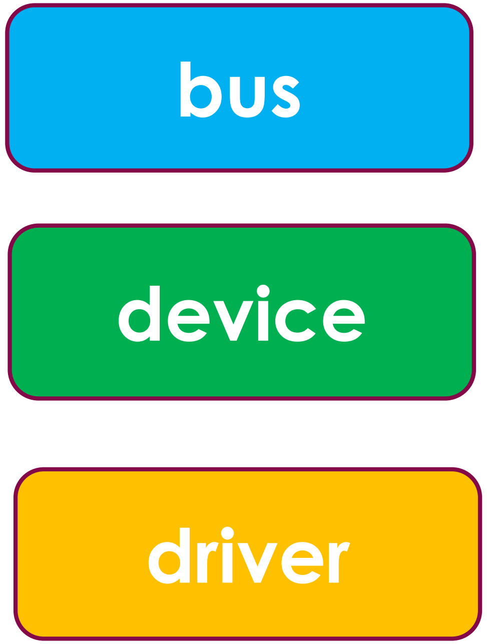
- Hot plug event are diversity in drivers, not all uio driver exposure hot plug event,

  need a general event from bus/device layer.

- Uevent is easy to use and management.
  - Netlink socket, kobject, asynchronous, sysfs, kernel space --> user space.
  - Abundant device status , like add/remove/change/online/offline.

why uevent ??

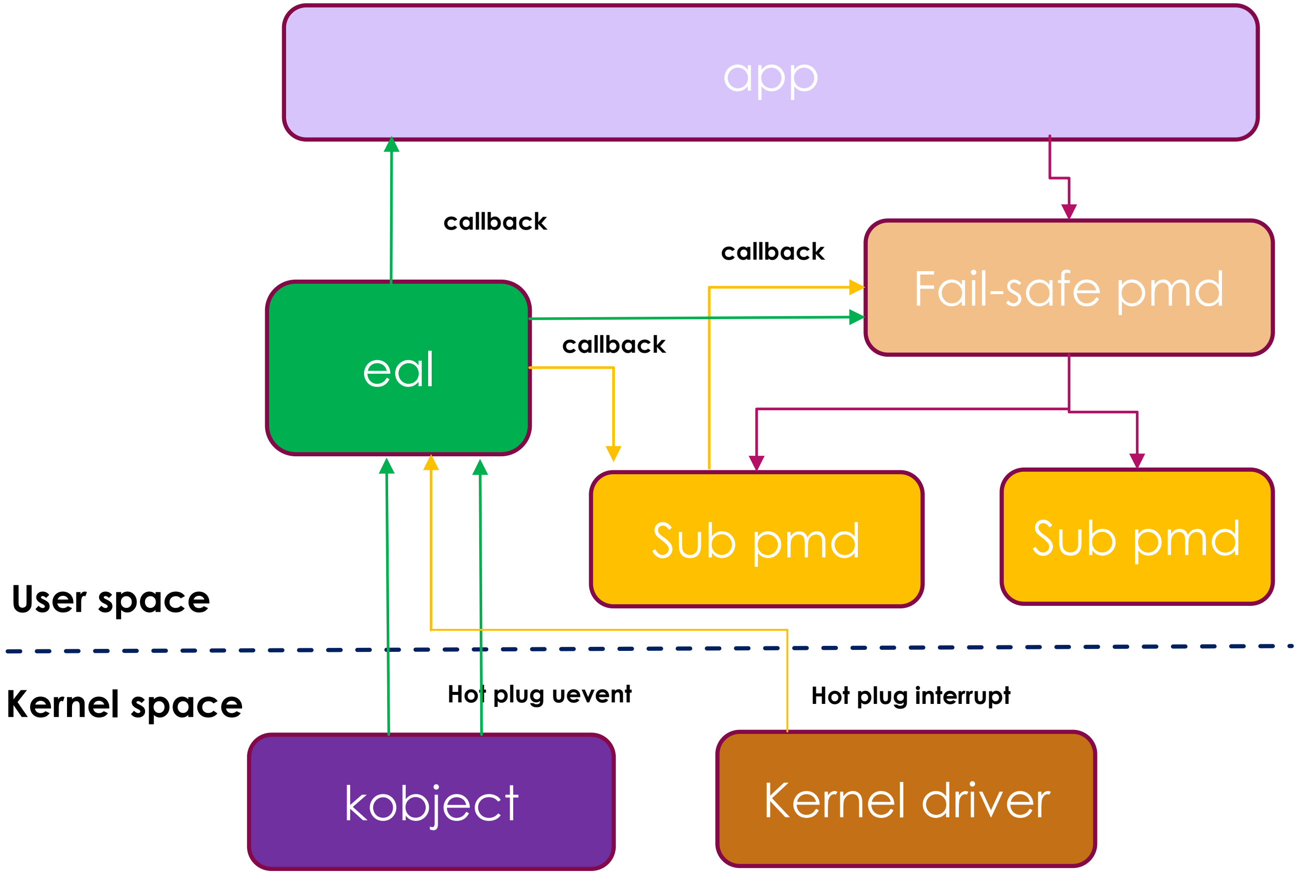
- Each component each scope, hot plug belong to device, might be better to offload it from app and driver to the bus/device layer of the eal core lib.



pci/vdev, ...	bus	scan / probe
kobject	device	attach/detach Uevent monitor
Igb_uio/vfio/ uio_generic/ other	driver	bind Initial Operation

Linux Kernel is useful,
Just use it.

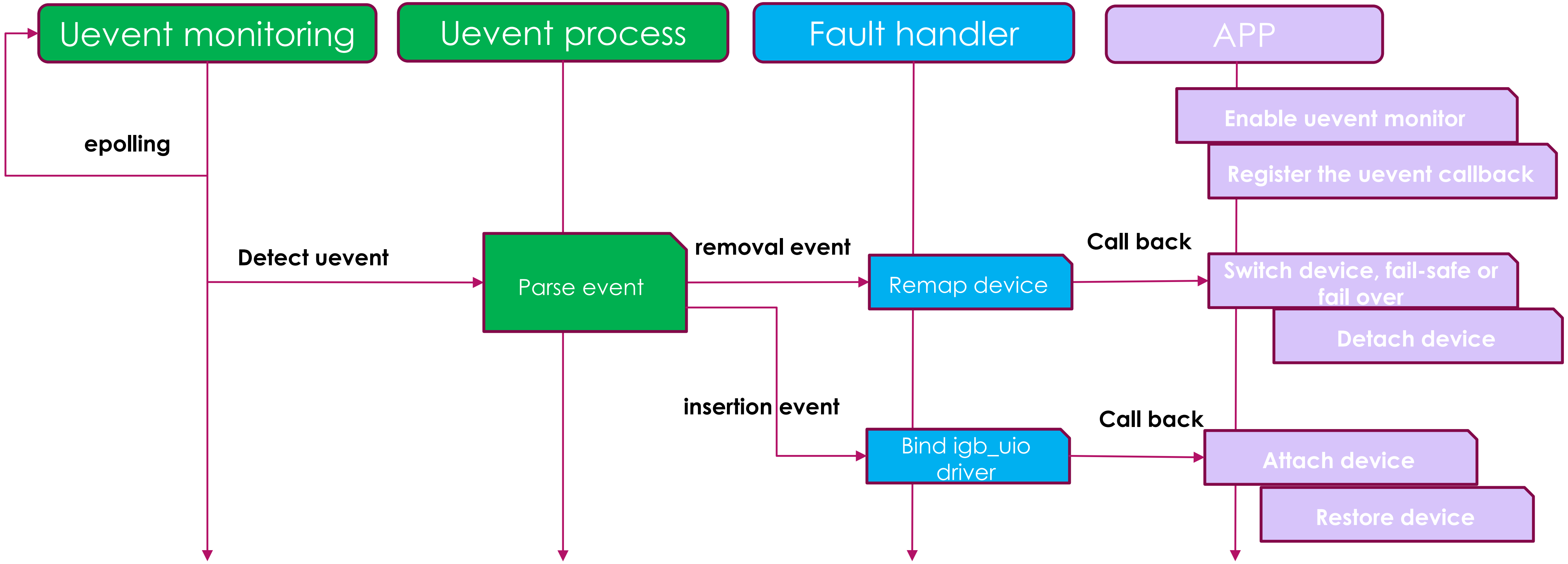
Uevent mechanism



Orange : Interrupt mechanism path

Blue : uevent mechanism path

Uevent processing



Uevent bring in.

uevent monitor:

- An new epolling, user register interesting event when start.
- A device_state machine in structure of rte_device.

  PARSED/ PROBED / FAULT
- dev_event_type enumerate and uevent structure in a new file eal_dev.h. BSD not support uevent.

  uev_monitor_enable / uev_receive / uev_parse / uev_process/

  dev_monitor_start / dev_monitor_stop

Uevent bring in..

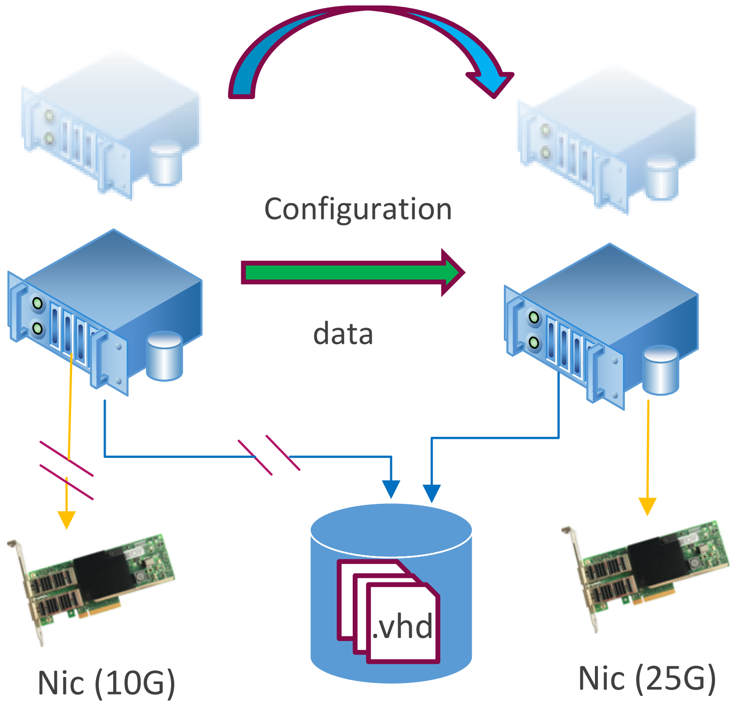
- Add below API in rte eal device for common
  - rte_eal_dev_monitor_enable
  - rte_dev_callback_register / rte_dev_callback_unregister
  - _rte_dev_callback_process
  - rte_dev_bind_driver

Uevent bring in…

Failure handler:

- add remap_device in bus layer, to remap the device resource to be “safe” before device detach.
- Add dev_bind_driver in device layer, to auto bind driver before device attach.
- Add find_device_by_name in bus layer, to find device in the device list of bus by the device name

Uevent in virtualization



- Uevent support vfio, each vdev have its own kobject and uevent, it directly process vfio uevent when pf hot plug.
- live migration, share memory (NFS) or block migration, detect the switching nic across the platform by uevent.
- uevent for virtio and SRIOV ???

Plan and Open…

- Make the API upstream, to public it for developer usage.
- Hot plug API + uevent + failsafe driver, integration and verification.
- Performance(hot plug action speed and packet loss) and robots.
- Co-work with community contributor, fix the gap with pci bus rework.

http://dpdk.org/dev/patchwork/patch/28949/
http://dpdk.org/dev/patchwork/patch/28950/

Questions ?

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