

Introduction to Suspend-to-Idle

Chen Yu

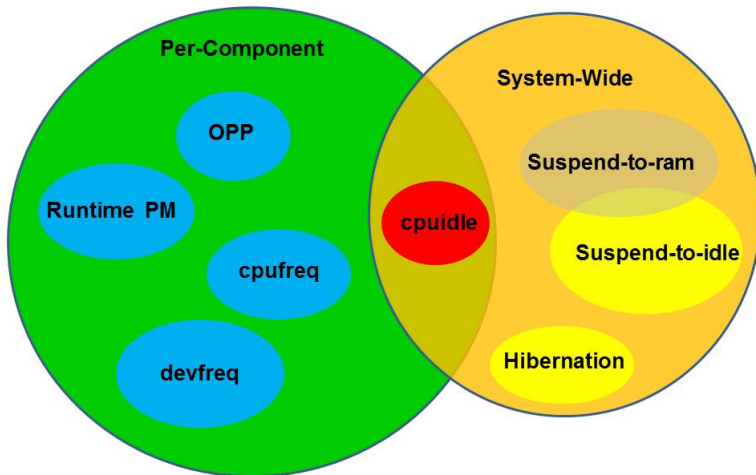
Intel Open Source Technology Center

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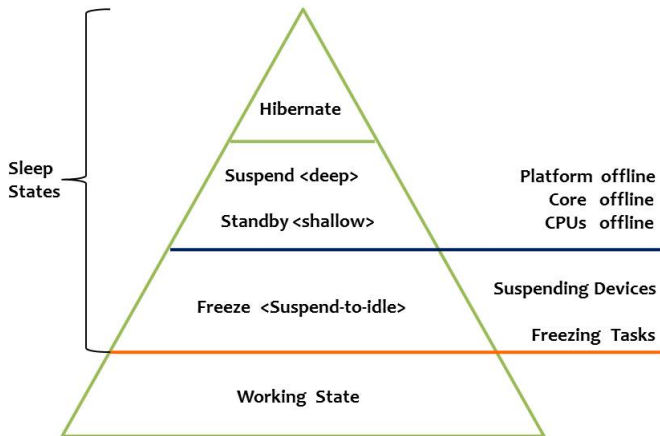
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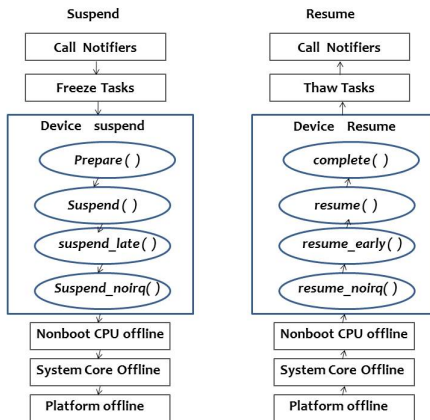
Linux Power Management Framework



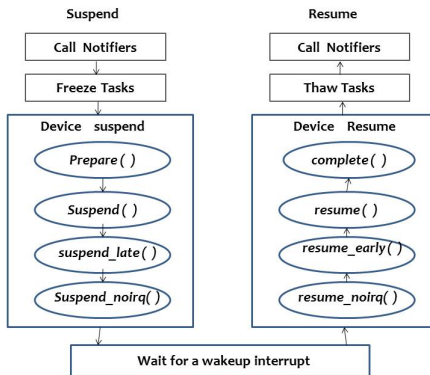
System-Wide Power Management



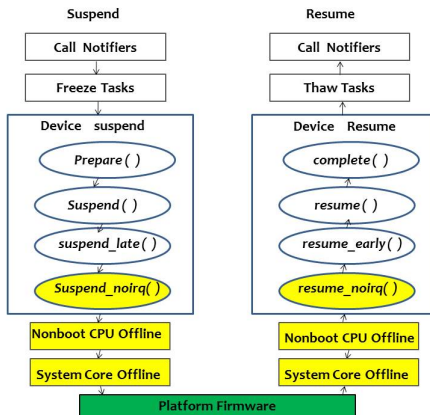
Full suspend



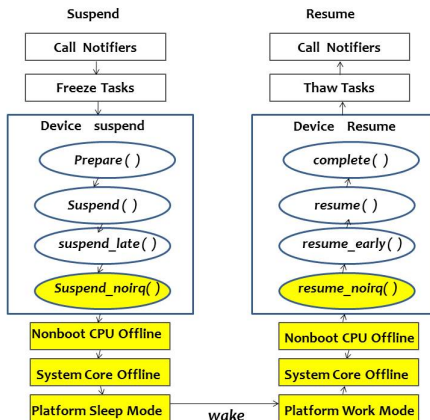
Suspend-to-Idle



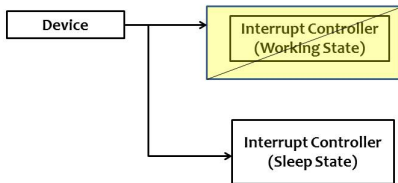
Full suspend wakeup with firmware(ACPI) support



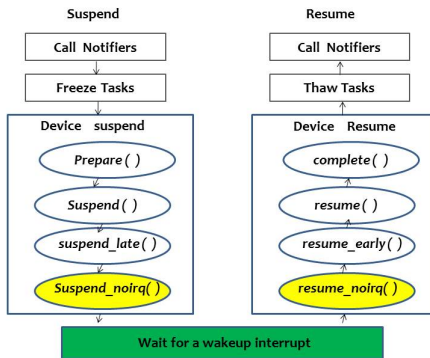
Full suspend wakeup with hardware support



Full suspend wakeup with extra- hardware support



Suspend-to-Idle wakeup



Usage

How to trigger

```
# echo freeze >/sys/power/state
```

Always available

```
# cat /sys/power/state  
freeze mem disk
```

Wakeup

Note: enable wakeup before suspend-to-idle

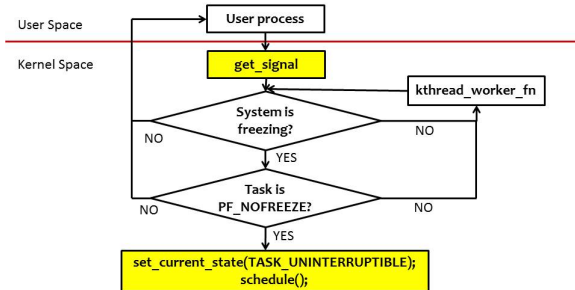
Implementation

- Freeze of tasks
- How to wake up

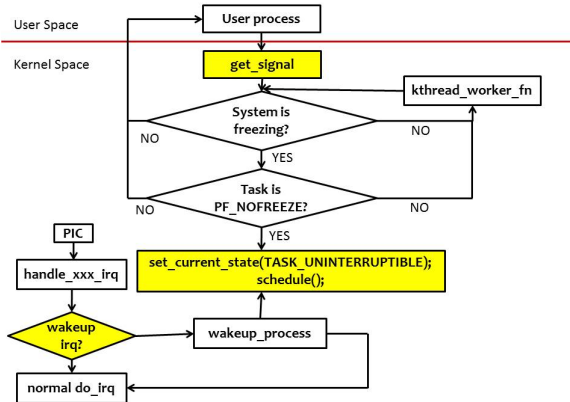
Freeze of tasks

- Why freeze tasks
- User processes (default: freeze)
- Kernel processes (default: not freeze)

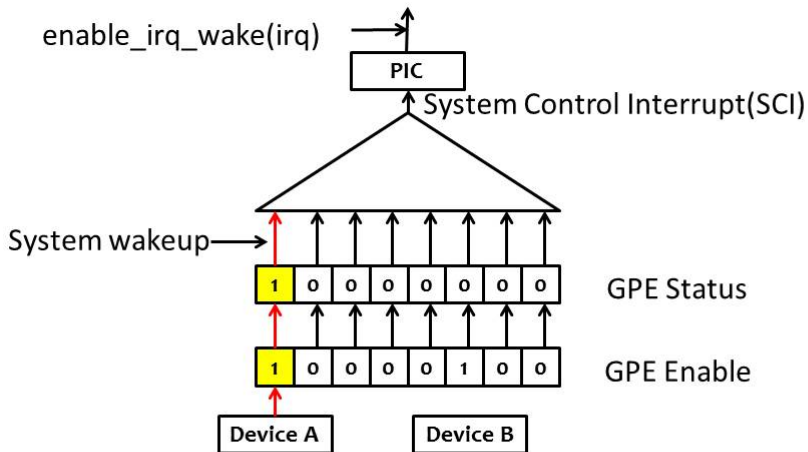
Freeze processes



Wakeup processes



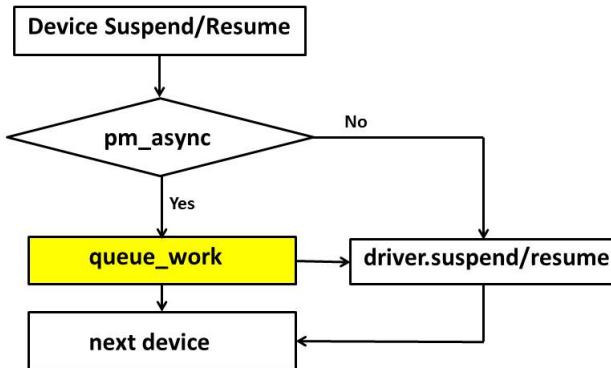
ACPI based wakeup



Optimization

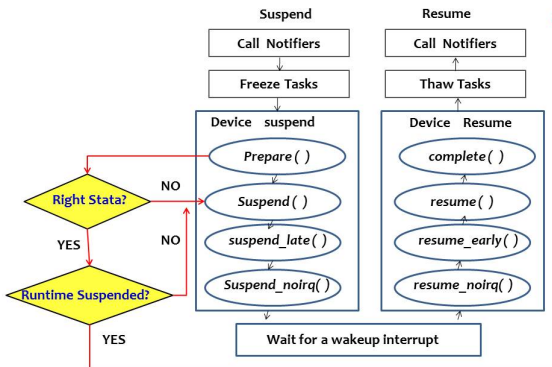
- pm_async
- suspend avoidance
- quiescent mode

pm_async

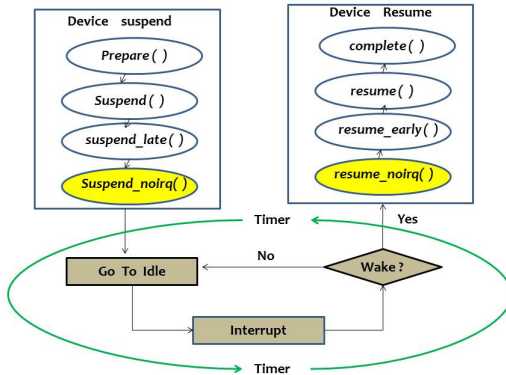


suspend avoidance

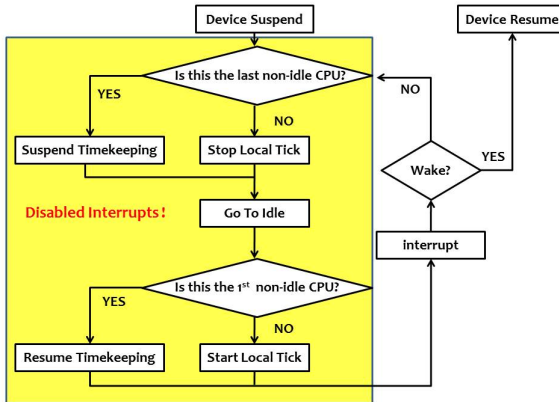
(discussion on maillist)



quiescent mode



quiescent mode



Debug

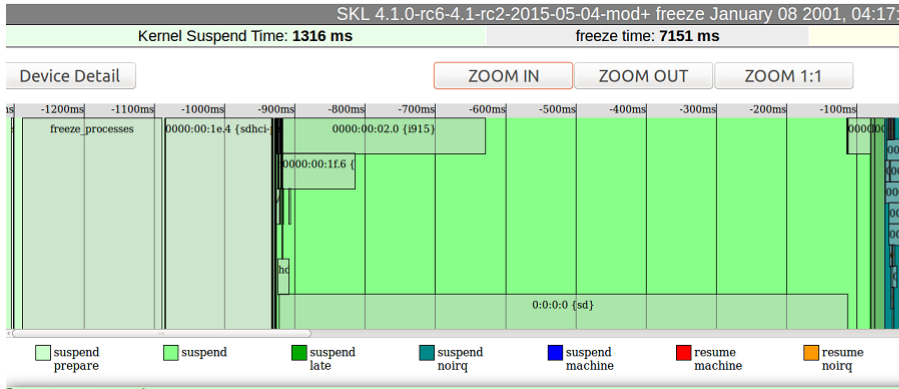
- pm_test
- AnalyzeSuspend

pm_test

available test mode

```
# cat /sys/power/pm_test  
none core processors platform devices freezer
```

analyze_suspend.py



Reference



R. J. Wysocki

Getting More Out Of System Suspend in Linux.

http://events.linuxfoundation.org/linux_suspend.pdf



R. J . Wysocki

What is Suspend-to-Idle and How to Make it Work.

<http://events.linuxfoundation.org/sites/events/files/slides/what-is-suspend-to-idle.pdf>

Documentation and Source Code

- Documentation/power/devices.txt
- Documentation/power/states.txt
- kernel/power/*
- kernel/time/tick-common.c,tick-broadcast.c

QA

Thank you!