



# GNOME Power Manager Solaris Power Management and

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2008-10-19



# Agenda

- Why Power Management
- Some Basic Concepts
- Solaris Power Management Framework
- Gnome Power Manager

# Government Regulations/Policy

- US EPA
  - > EPA MOU3 (Effective July 1, 1999)
  - > EPA MOU4 (Effective July1, 2007)

EPA runs Energy Star program to get devices to consume less power by increasing energy efficiency.

There was a series of MOU's issued by the EPA, each one stricter than the previous one. Each one took effect until replaced by the next one.

- Chinese government policy
  - > 节能简排 Jie Neng Jian Pai
    - Save energy and reduce pollutants discharge

# Some Basic Concepts

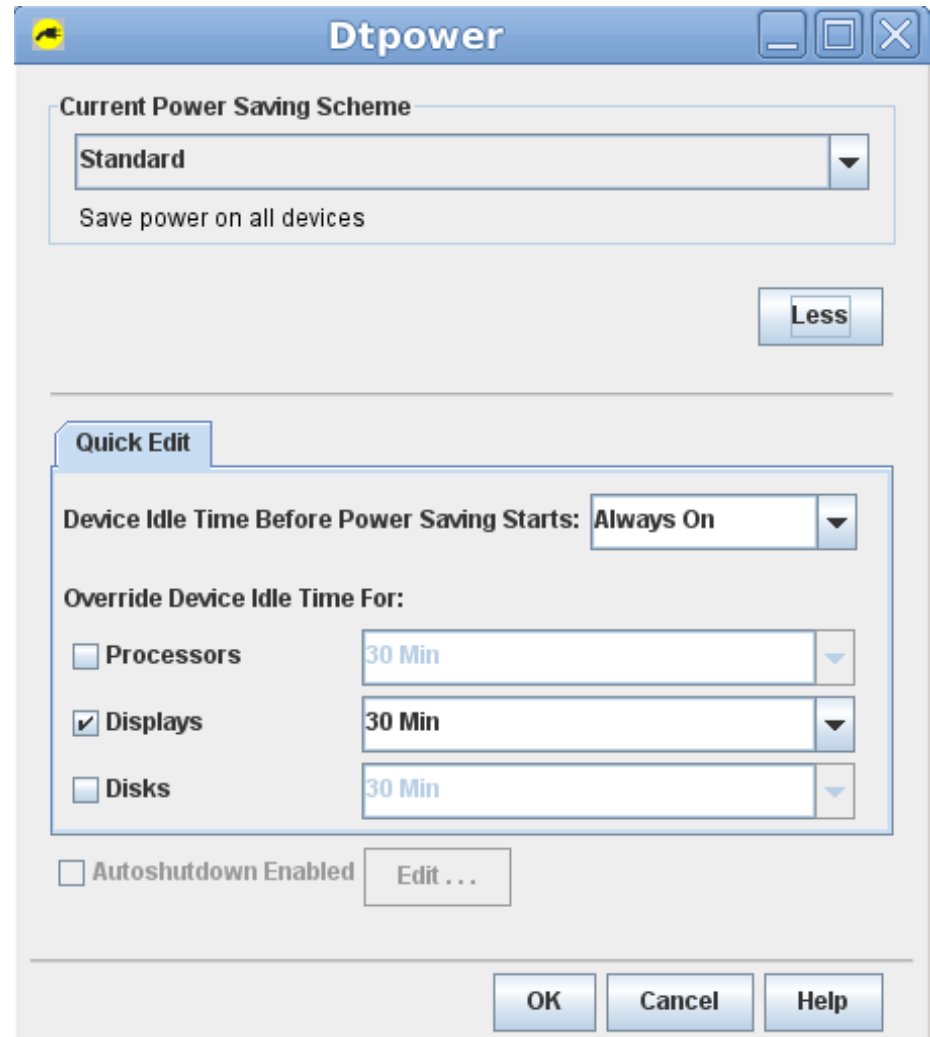
- Sleep
- Suspend (Stand-by, S3)
- Hibernate(S4)
- Shutdown

# Solaris Power Management Framework

- Device power management
- System power management
- Tools

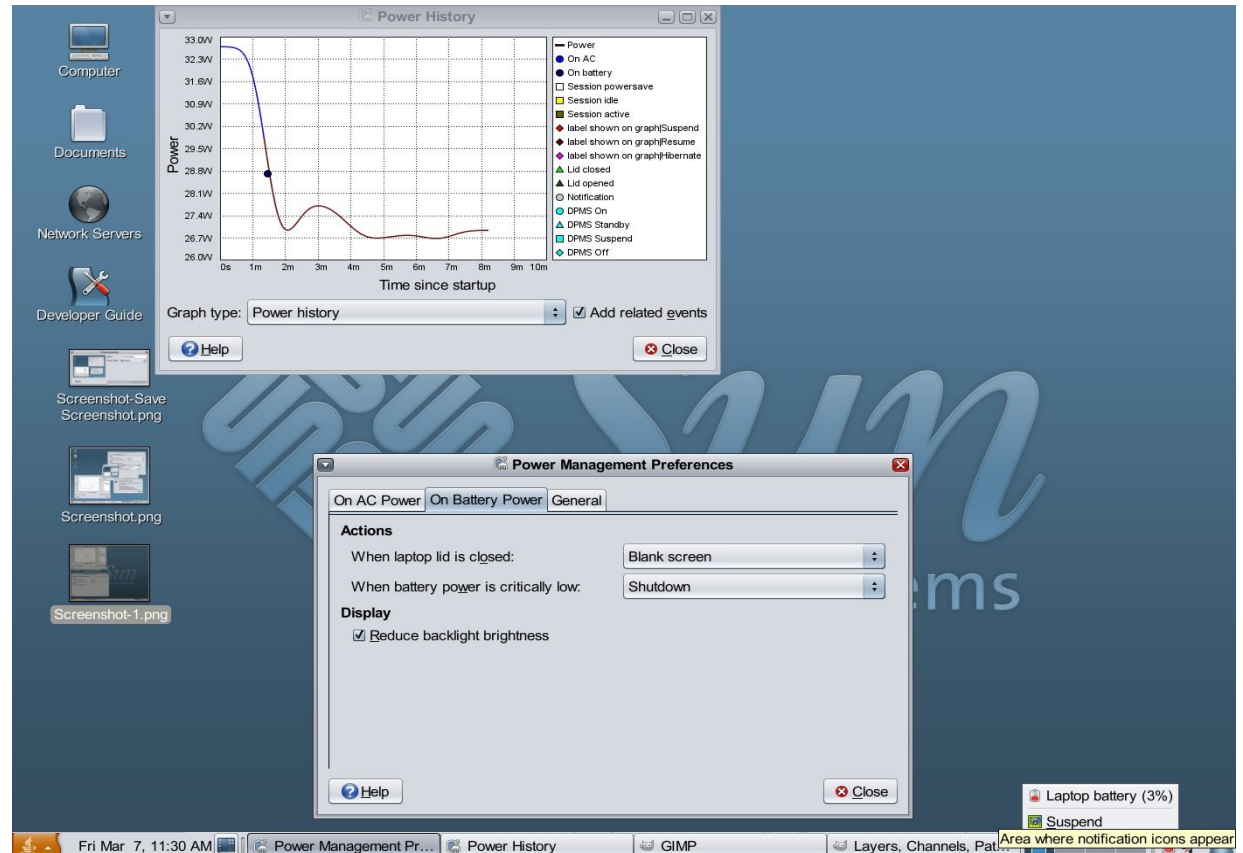
# dtpower

- Power scheme
  - > Standard
  - > Minimal
  - > Disabled
  - > Customized
- Device Idle Time
- Processor
- Displays
- Disks
- Autoshutdown



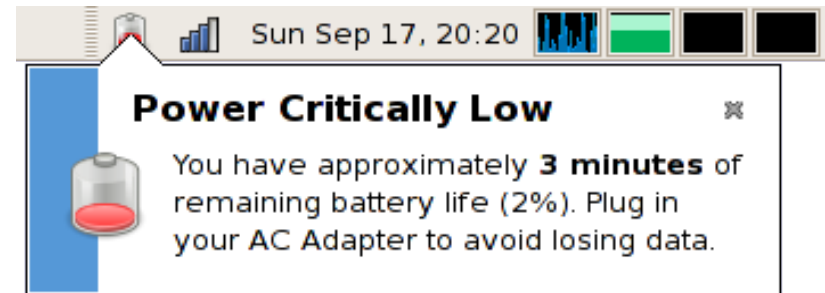
# What is GNOME Power Manager

- A PM GUI front-end
- A session daemon



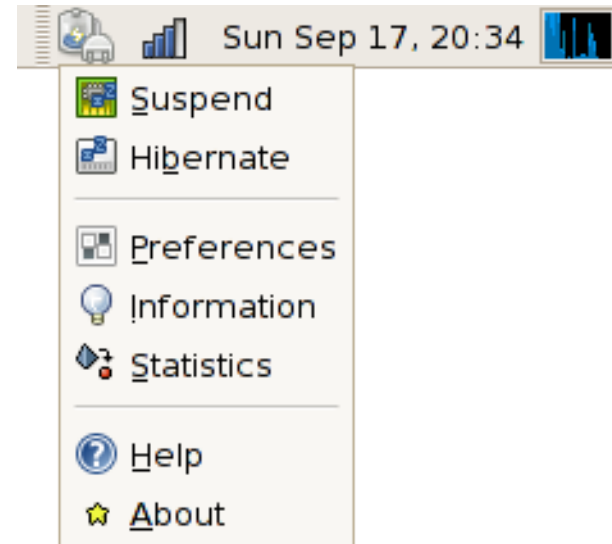
# Features (1)

- Monitor battery status
- Trigger an action when lid is closed
- Set CPU power consuming policy

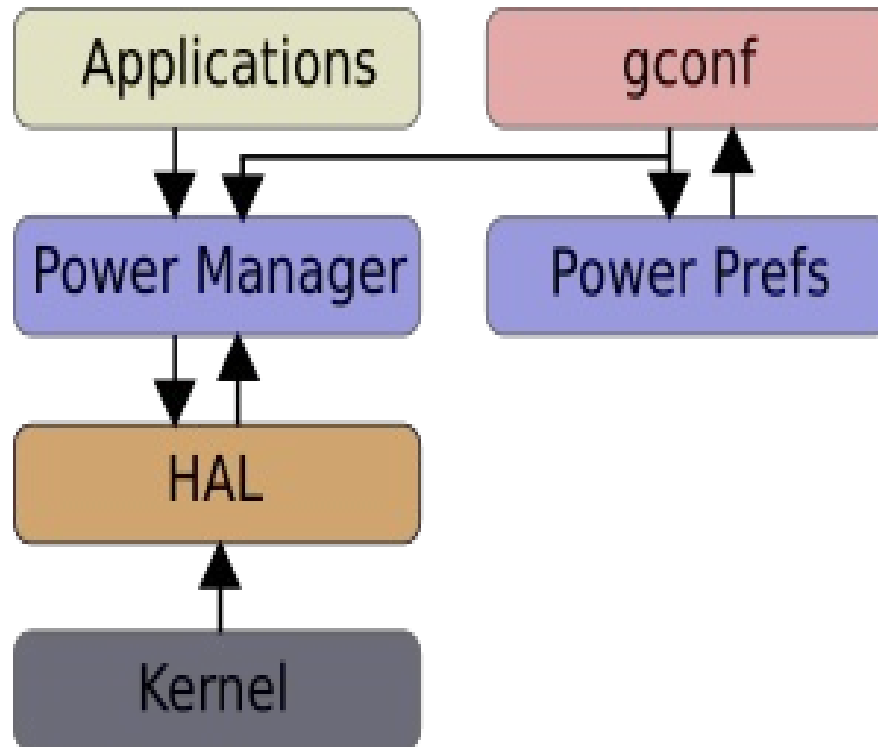


## Features (2)

- Set power button policy
- Adjust laptop screen brightness
- Suspend/hibernate system
- Visualize power consumption statistics



# GNOME Power Manager



# GNOME Power Manager

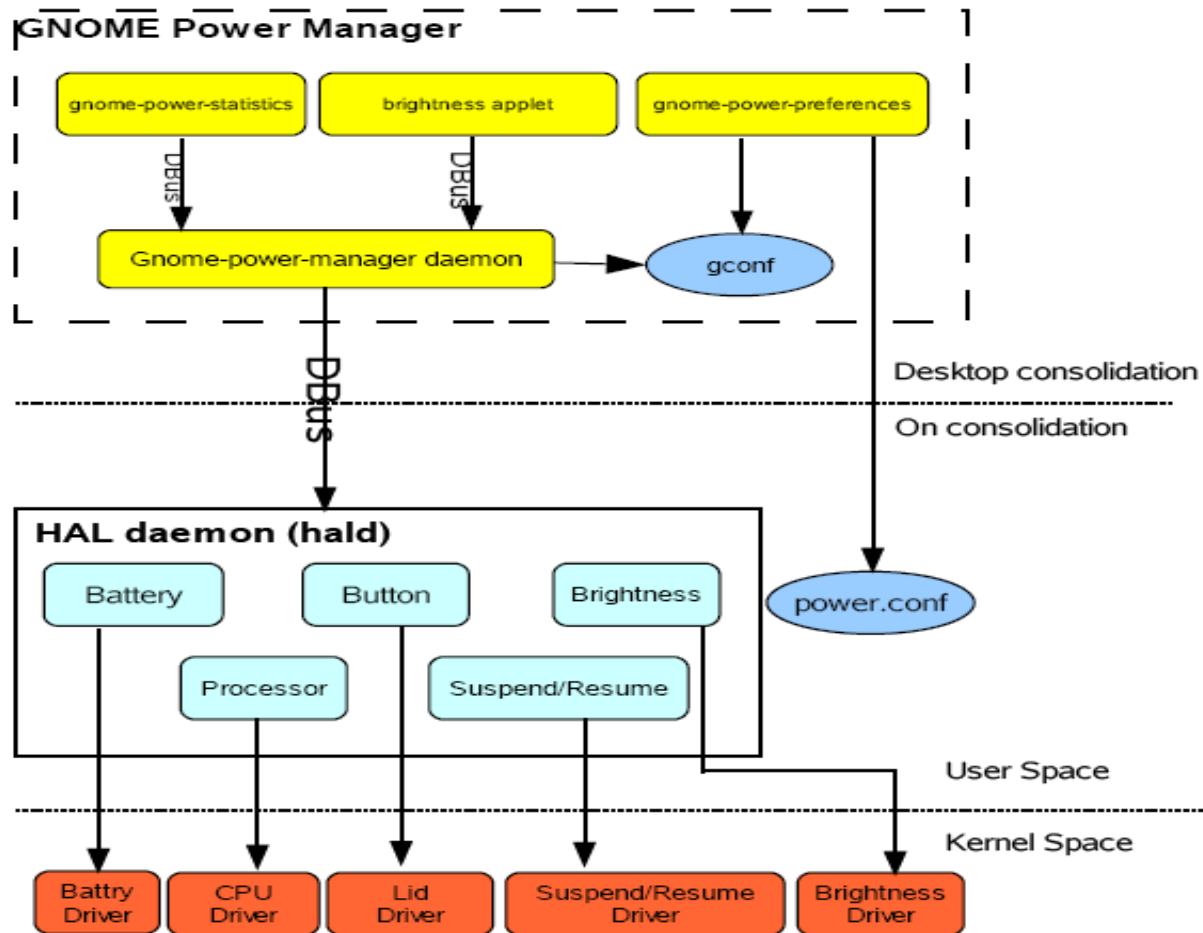
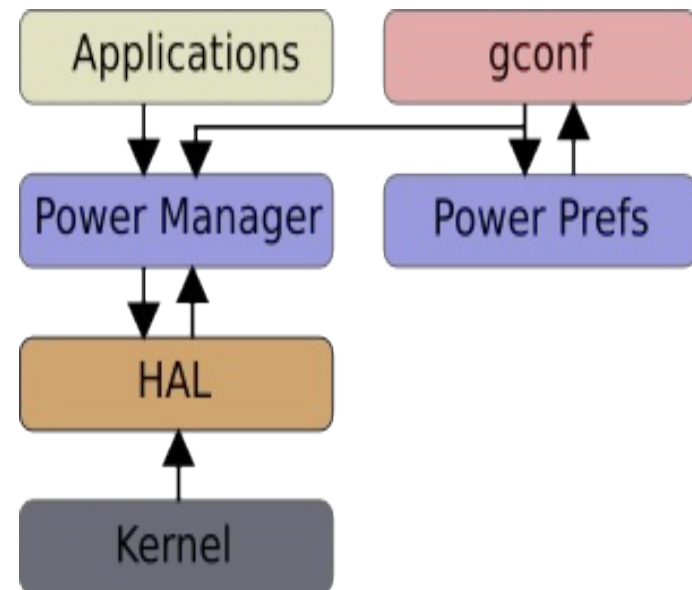


Diagram: Architecture of Power Manager

# Communication through D-Bus

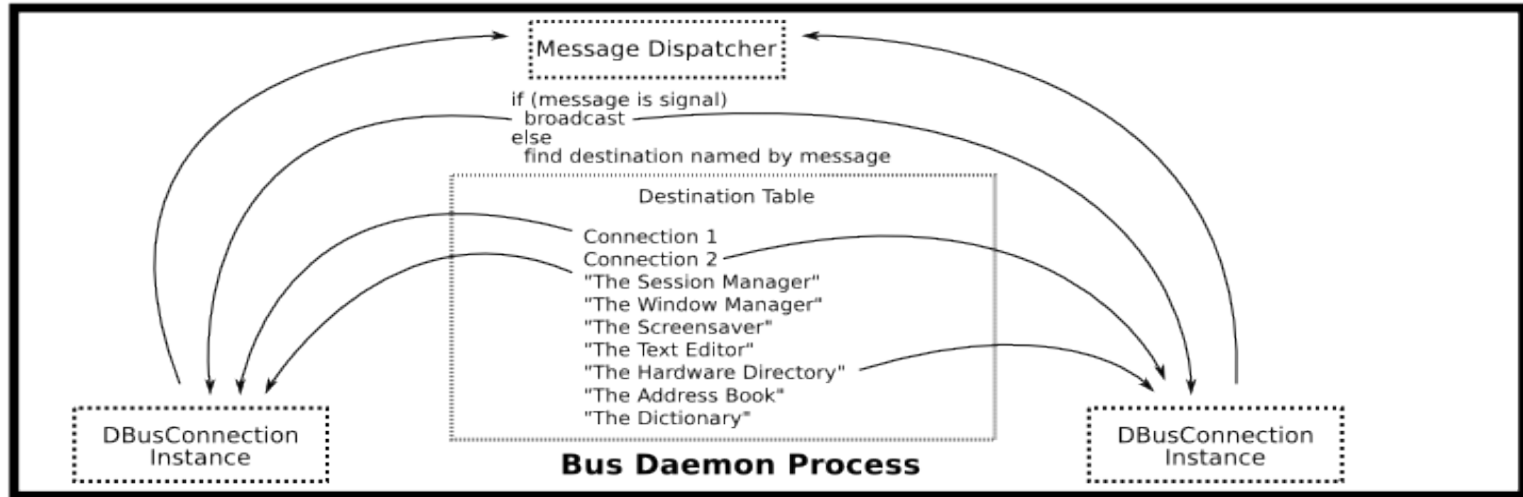
- A light weight inter-process communication way
- Communication between GPM processes in the same session
- Communication between the desktop session and HAL daemon



# D-Bus Protocol

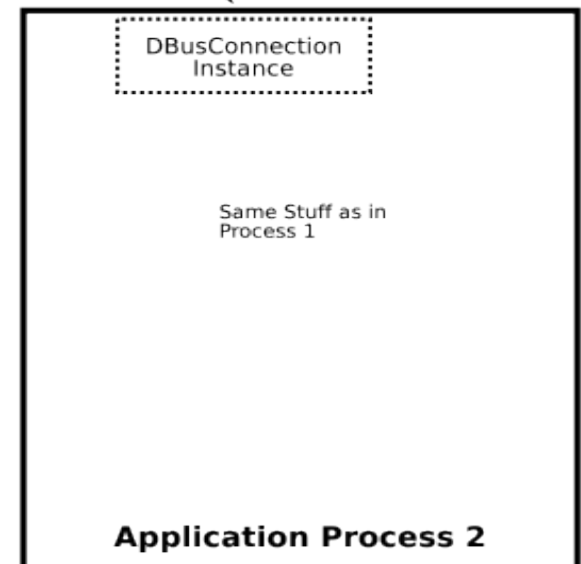
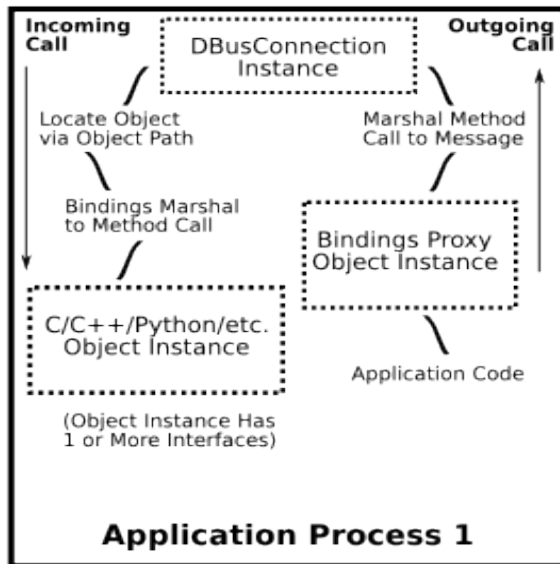
- Binary protocol: carries a structured view of the data, integral numbers, floating-point numbers, strings, compound types, and so on
- Connection-based (by Unix domain socket)
- Work in term of messages rather than byte-streams.
- Message types
  - > Method call message
  - > Method return message
  - > Error message
  - > Signal message

# How it works



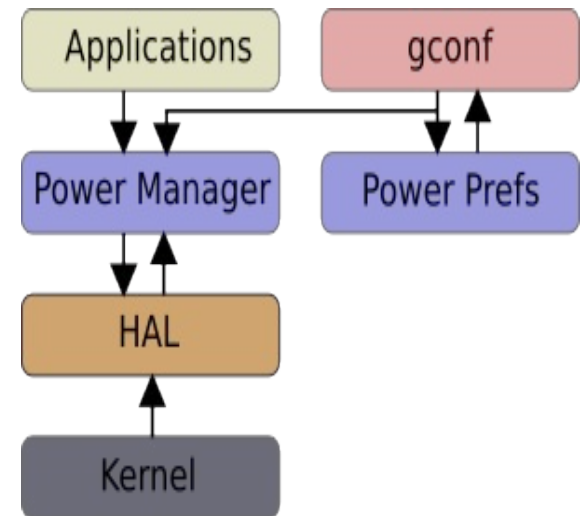
↕ Socket (Bidirectional Message Stream)

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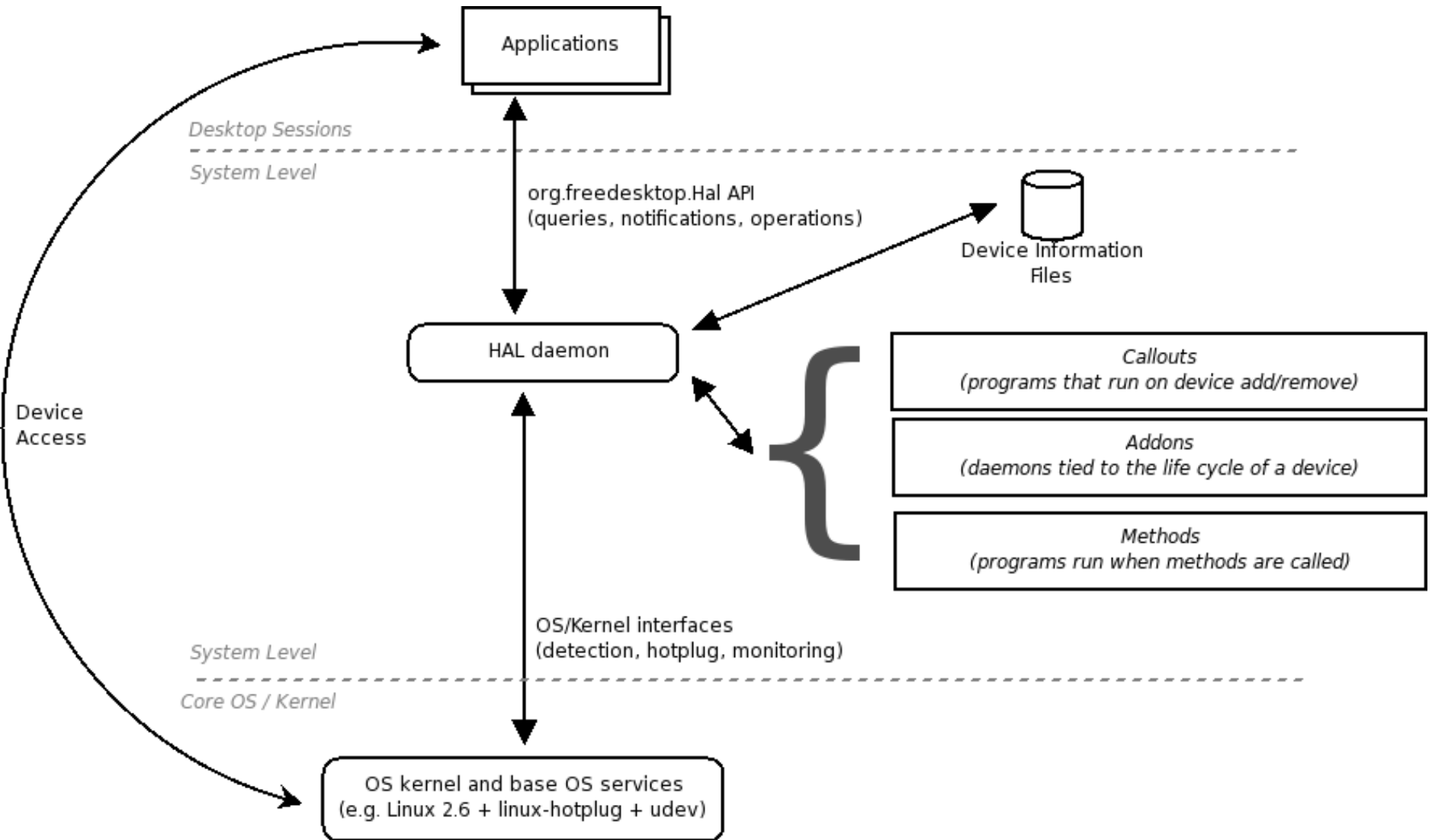


# What is HAL

- HAL (Hardware Abstraction Layer) provides a view of the various hardware attached to a system
- HAL represents a piece of hardware as a device object with properties.
- HAL provides an easy-to-use API through D-BUS



# HAL Architecture

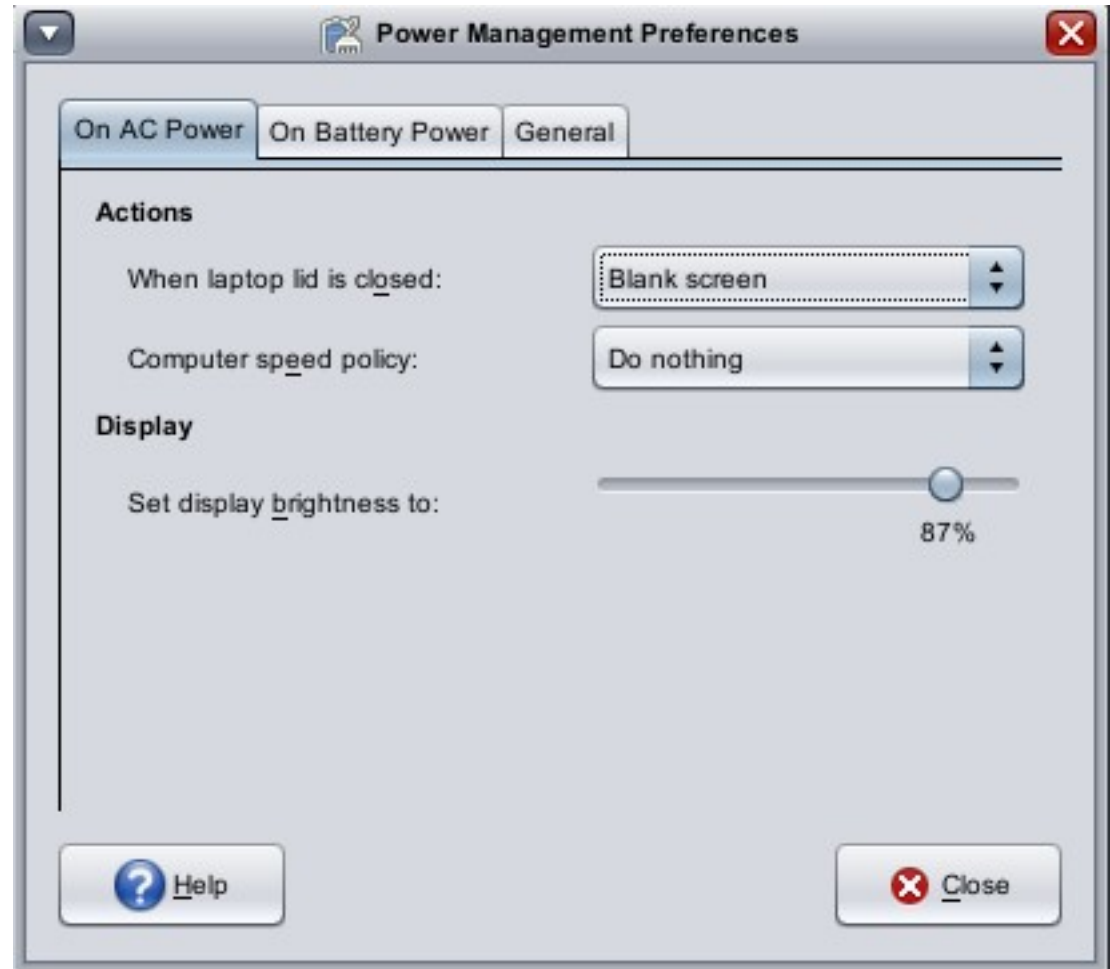


# gnome-power-manager

- Session daemon
- Monitor PM events
  - > Battery
  - > Lid
  - > Power button
- Perform PM policies

# gnome-power-preferences (1)

- Configure PM policies
  - > AC mode
  - > Battery mode
  - > CPU policy



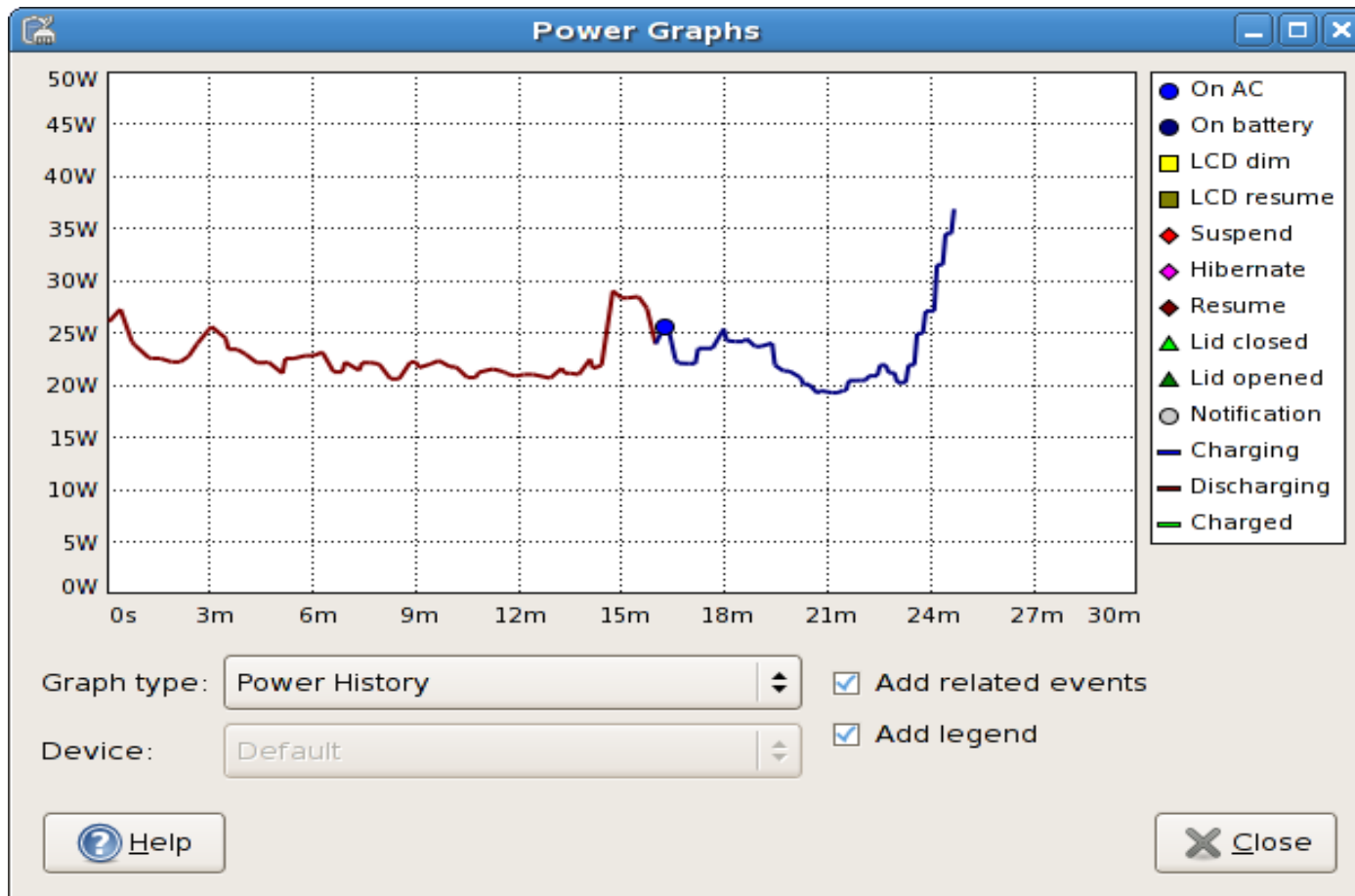
# gnome-power-preferences(2)

- Actions
  - > Blank screen
  - > Suspend
  - > Hibernate
  - > Shutdown
  - > Do nothing
- Brightness
- CPU Speed
  - > ondemand
  - > performance



# gnome-power-statistics

- Visualize the power consumption



# References

- GPM Project page:
  - > <http://www.gnome.org/projects/gnome-power-manager>
- HAL Page:
  - > <http://www.freedesktop.org/wiki/Software/hal>
- Dbus:
  - > <http://www.freedesktop.org/wiki/Software/dbus>

# Demo



**Thanks**