Managing Linux Kernel Confibs
With Config Fragments

Darren Hart
Director / Open Source Technology Center
Linux Platform Driver x86 Maintainer
October 2018
Linux Kernel Configurations

```bash
# CONFIG VFIO is not set
# CONFIG VFIO DRIVERS is not set
CONFIG_VFIO_MENU=y
# CONFIG VFIO_PCI is not set
# CONFIG VFIO_MMD is not set
# Microsoft Hyper-V guest support
# CONFIG STAGING is not set

CONFIG_X86_PLATFORM_DEVICES=y
CONFIG_ACER_WMI=m
CONFIG_ACER_WIRELESS=m
CONFIG_ACERHDF=m
CONFIG_ALCINTAG_WMI=m
CONFIG_ASUS_LAPTOP=m
CONFIG_DELT_SMBIOS=m
CONFIG_DELT_SMBIOS_WMI=y
CONFIG_DELT_LAPTOP=m
CONFIG_DELT_WMI=m
CONFIG_DELT_WMI_DESCRIPTOR=m
CONFIG_DELT_WMI_AIO=m
CONFIG_DELT_WMI_LED=m
CONFIG_DELT_SM8888=m
CONFIG_DELT_BBIN=m
CONFIG_FUJITSU_LAPTOP=m
CONFIG_FUJITSU_TABLET=m
CONFIG_AMILIO_BRIX=m
CONFIG_GPD_POCKET_FAN=m
CONFIG_HP_ACCEL=m
CONFIG_HP_WIRELESS=m
CONFIG_HP_WMI=m
CONFIG_MSI_LAPTOP=m
CONFIG_PANASONIC_LAPTOP=m
```
CONFIG Count

17,209
CONFIG Count

3.0 to 4.18

17,209
CONFIG Count

3.0 to 4.18
Defconfig CONFIG Count

3.0 to 4.18

CONFIG Options by Version

4,368
Defconfig Diff
3.0 to 4.18

Defconfig Diff by Version

~500
Defconfig Diff
3.0 to 4.18
Defconfig Diff
3.0 to 4.18

Defconfig Diff by Version

~100
That only maintains the default, you haven’t even made any changes!
Kconfig Language Overview

**type:** bool | tristate | string | hex | int

**prompt:** user visible description [if <expr>]

**default:** y | m | n

**depends:** on SYMBOL [if <expr>]

**select:** SYMBOL [if <expr>]

For excruciating detail, see Documentation/kbuild/kconfig-language.txt
CONFIG Revision Control
A Good Commit Contains...

1. Problem **description**
2. Developer **intent**
3. **Changes** address the problem and match intent
4. **Nothing else**
Enable DELL SMBIOS Driver

CONFIG_ACPI_WMI=y
CONFIG_DELL_SMBIOS=m
CONFIG Diff
Enable DELL_SMBIOS_WMI

--- config-data.q24A/v4.18.15-defconfig.config
+++ .config
  2018-10-20 21:47:33.442442088 -0700
@@ -3382,10 +3382,18 @@ CONFIG_VIRTIO_MENU=y
 # CONFIG_STAGING is not set
 CONFIG_X86_PLATFORM_DEVICES=y
 +# CONFIG_ACER_WMI is not set
 # CONFIG_ACER_WIRELESS is not set
 # CONFIG_ACERHDF is not set
 +# CONFIG_ALIENWARE_WMI is not set
 # CONFIG_ASUS_LAPTOP is not set
-# CONFIG_DELL_SMBIOS is not set
+CONFIG_DELL_SMBIOS=m
+CONFIG_DELL_SMBIOS_WMI=y
 +# CONFIG_DELL_LAPTOP is not set
+CONFIG_DELL_WMI is not set
+CONFIG_DELL_WMI_DESCRIPTOR=m
+# CONFIG_DELL_WMI_AIO is not set
+# CONFIG_DELL_WMI_LED is not set
 # CONFIG_DELL_SMO8800 is not set
 # CONFIG_FUJITSU_LAPTOP is not set
@@ -3403,11 +3412,17 @@ CONFIG_X86_PLATFORM_DEVICES=y
 # CONFIG_SENSORS_HDAPS is not set
 # CONFIG_INTEL_MENLOW is not set
 CONFIG_EEEPC_LAPTOP=y
+# CONFIG_ASUS_WMI is not set
-# CONFIG_ACPI_WMI is not set
+# CONFIG_ACPI_WMI=m
+CONFIG_WMI_BMOF=m
+# CONFIG_INTEL_WMI_THUNDERBOLT is not set
+# CONFIG_MSI_WMI is not set
+# CONFIG_PEAQ_WMI is not set
+# CONFIG_TOPSTAR_LAPTOP is not set
 # CONFIG_TOSHIBA_BT_RFKILL is not set
 # CONFIG_TOSHIBA_HAPS is not set
+# CONFIG_TOSHIBA_WMI is not set
 # CONFIG_ACPI_CMPC is not set
 # CONFIG_INTEL_BMOF is not set
@@ -3415,6 +3430,7 @@ CONFIG_EEEPC_LAPTOP=y
 # CONFIG_INTEL_PMC_CORE is not set
 # CONFIG_INETBRTL is not set
 # CONFIG_SAMSUNG_LAPTOP is not set
+# CONFIG_MXM_WMI is not set
 # CONFIG_INTEL_OAKTRAIL is not set
 # CONFIG_SAMSUNG_Q10 is not set
 # CONFIG_APPLE_GMUX is not set

57 Line Diff
CONFIG Diff
Enable DELL_SMBIOS_WMI

--- config-data.qZ4A/v4.18.15-defconfig.config
+++ .config
2018-10-20 21:47:33.442444208 -0700
@@ -3382,10 +3382,18 @@
 CONFIG_VIRTIO_MENU=y
 #
 # CONFIG_STAGING is not set
+CONFIG_ACER_WMI is not set
 # CONFIG_ACER_WIRELESS is not set
 # CONFIG_ACERHDF is not set
+# CONFIG_ALIENWARE_WMI is not set
 # CONFIG_ASEUS_LAPTOP is not set
-CONFIG_DELL_SMBIOS is not set
+CONFIG_DELL_SMBIOS=m
+CONFIG_DELL_SMBIOS_WMI=y
+# CONFIG_DELL_LAPTOP is not set
+# CONFIG_DELL_WMI is not set
+# CONFIG_DELL_WMI_DESCRIPTOR=m
+# CONFIG_DELL_WMI_AIO is not set
+# CONFIG_DELL_WMI_LED is not set
 # CONFIG_DELL_SMO8800 is not set
 # CONFIG_DELL_RBTN is not set
-CONFIG_FUJITSU_LAPTOP is not set
@@ -3394,6 +3402,7 @@
 CONFIG_X86_PLATFORM_DEVICES=y
 # CONFIG_SENSORS_HDAPS is not set
 # CONFIG_INTEL_MENLOW is not set
-CONFIG_EEEPC_LAPTOP=y
+# CONFIG_ASEUS_WMI is not set
+# CONFIG_ASEUS_WIRELESS is not set
-CONFIG_ACPI_WMI is not set
+CONFIG_ACPI_WMI=m
+CONFIG_WMI_BMOF=m
+# CONFIG_INTEL_WMI_THUNDERBOLT is not set
+# CONFIG_MSI_WMI is not set
+# CONFIG_PEAQ_WMI is not set
+# CONFIG_TOPSTAR_LAPTOP is not set
 # CONFIG_TOSHIBA_BT_RFKILL is not set
 # CONFIG_TOSHIBA_HAPS is not set
+# CONFIG_TOSHIBA_WMI is not set
 # CONFIG_ACPI_CMPC is not set

 57 Line Diff
Enable DELL_SMBIOS_WMI

commit 572a24910d65a6ec994173edc6f383dabc0ff607 (HEAD)
Author: Darren Hart (VMware) <dvhart@infradead.org>
Date:   2018-10-23

    config: Add DELL_SMBIOS support

    Add support for the dell_smbios driver with the default ACPI WMI backend.

Signed-off-by: Darren Hart (VMware) <dvhart@infradead.org>

diff --git a/arch/x86/configs/dell-smbios-wmi.config b/arch/x86/configs/dell-smbios-wmi.config
new file mode 100644
index 0000000..7ac1c82
--- /dev/null
+++ b/arch/x86/configs/dell-smbios-wmi.config
@@ -0,0 +1,4 @@
+CONFIG_ACPI_WMI=m
+CONFIG_DELL_SMBIOS=m
+CONFIG_DELL_SMBIOS_WMI=y
CONFIG Fragment Processing

dvhart@fedora:/source/linux/linux-stable-config [(v4.18.15)]
$ make defconfig dell-smbios-wmi.config | grep -ve "^" "
*** Default configuration is based on 'x86_64_defconfig'
#
# configuration written to .config
#
# Using .config as base
# Merging ./arch/x86/configs/dell-smbios-wmi.config
Value of CONFIG ACPI_WMI is redefined by fragment ./arch/x86/configs/dell-smbios-wmi.config:
Previous value: # CONFIG ACPI_WMI is not set
New value: CONFIG ACPI_WMI=m

Value of CONFIG_DELL_SMBIOS is redefined by fragment ./arch/x86/configs/dell-smbios-wmi.config:
Previous value: # CONFIG DELL_SMBIOS is not set
New value: CONFIG_DELL_SMBIOS=m

#
# merged configuration written to .config (needs make)
#
scripts/kconfig/conf --oldconfig Kconfig
*
* Restart config...
* 
* X86 Platform Specific Device Drivers
* X86 Platform Specific Device Drivers (X86_PLATFORM_DEVICES) [Y/n/?] y
#
# configuration written to .config
#
dvhart@fedora:/source/linux/linux-stable-config [(v4.18.15)]
$
merge_config.sh

$ scripts/kconfig/merge_config.sh -h
Usage: scripts/kconfig/merge_config.sh [OPTIONS] [CONFIG [...]]
   -h  display this help text
   -m  only merge the fragments, do not execute the make command
   -n  use allnoconfig instead of alldefconfig
   -r  list redundant entries when merging fragments
   -o  dir to put generated output files. Consider setting $KCONFIG_CONFIG instead.

$
CONFIG Fragment Organization

• Distro policy
• Machine architecture
• Platform enabling
• Generic drivers
Looking Forward…

• Menuconfig could generate fragments
• Avoid silent errors
• Final config audit
Thank You

Darren Hart <dvhart@vmware.com>