SERIAL DEVICE NAMING

As of 2.6.10, serial devices on ia64 are named based on the order of ACPI and PCI enumeration. The first device in the ACPI namespace (if any) becomes /dev/ttyS0, the second becomes /dev/ttyS1, etc., and PCI devices are named sequentially starting after the ACPI devices.

Prior to 2.6.10, there were confusing exceptions to this:

- Firmware on some machines (mostly from HP) provides an HCDP table[1] that tells the kernel about devices that can be used as a serial console. If the user specified "console=ttyS0" or the EFI ConOut path contained only UART devices, the kernel registered the device described by the HCDP as /dev/ttyS0.

- If there was no HCDP, we assumed there were UARTs at the legacy COM port addresses (I/O ports 0x3f8 and 0x2f8), so the kernel registered those as /dev/ttyS0 and /dev/ttyS1.

Any additional ACPI or PCI devices were registered sequentially after /dev/ttyS0 as they were discovered.

With an HCDP, device names changed depending on EFI configuration and "console=" arguments. Without an HCDP, device names didn't change, but we registered devices that might not really exist.

For example, an HP rx1600 with a single built-in serial port (described in the ACPI namespace) plus an MP[2] (a PCI device) has these ports:

	MMIO address	pre-2.6.10 (EFI console on builtin)	pre-2.6.10 (EFI console on MP port)	2.6.10
builtin	0xff5e0000	ttyS0	ttyS1	ttyS0
MP UPS	0xf8031000	ttyS1	ttyS2	ttyS1
MP Console	0xf8030000	ttyS2	ttyS0	ttyS2
MP 2	0xf8030010	ttyS3	ttyS3	ttyS3
MP 3	0xf8030038	ttyS4	ttyS4	ttyS4

CONSOLE SELECTION

EFI knows what your console devices are, but it doesn't tell the kernel quite enough to actually locate them. The DIG64 HCDP table[1] does tell the kernel where potential serial console devices are, but not all firmware supplies it. Also, EFI supports multiple simultaneous consoles and doesn't tell the kernel which should be the "primary" one.

So how do you tell Linux which console device to use?

- If your firmware supplies the HCDP, it is simplest to configure EFI with a single device (either a UART or a VGA card) as the console. Then you don't need to tell Linux

anything; the kernel will automatically use the EFI console.

(This works only in 2.6.6 or later; prior to that you had to specify "console=ttyS0" to get a serial console.)

- Without an HCDP, Linux defaults to a VGA console unless you specify a "console=" argument.

NOTE: Don't assume that a serial console device will be /dev/ttyS0. It might be ttyS1, ttyS2, etc. Make sure you have the appropriate entries in /etc/inittab (for getty) and /etc/securetty (to allow root login).

EARLY SERIAL CONSOLE

The kernel can't start using a serial console until it knows where the device lives. Normally this happens when the driver enumerates all the serial devices, which can happen a minute or more after the kernel starts booting.

2.6.10 and later kernels have an "early uart" driver that works very early in the boot process. The kernel will automatically use this if the user supplies an argument like "console=uart,io,0x3f8", or if the EFI console path contains only a UART device and the firmware supplies an HCDP.

TROUBLESHOOTING SERIAL CONSOLE PROBLEMS

No kernel output after elilo prints "Uncompressing Linux... done":

- You specified "console=ttyS0" but Linux changed the device to which ttyS0 refers. Configure exactly one EFI console device[3] and remove the "console=" option.

- The EFI console path contains both a VGA device and a UART. EFI and elilo use both, but Linux defaults to VGA. Remove the VGA device from the EFI console path[3].

- Multiple UARTs selected as EFI console devices. EFI and elilo use all selected devices, but Linux uses only one. Make sure only one UART is selected in the EFI console path[3].

- You're connected to an HP MP port[2] but have a non-MP UART selected as EFI console device. EFI uses the MP as a console device even when it isn't explicitly selected. Either move the console cable to the non-MP UART, or change the EFI console path[3] to the MP UART.

Long pause (60+ seconds) between "Uncompressing Linux... done" and start of kernel output:

- No early console because you used "console=ttyS<n>". Remove the "console=" option if your firmware supplies an HCDP.

- If you don't have an HCDP, the kernel doesn't know where

your console lives until the driver discovers serial devices. Use "console=uart, io,0x3f8" (or appropriate address for your machine).

Kernel and init script output works fine, but no "login:" prompt:

- Add getty entry to /etc/inittab for console tty. Look for the "Adding console on ttyS<n>" message that tells you which device is the console.

"login:" prompt, but can't login as root:

- Add entry to /etc/securetty for console tty.

No ACPI serial devices found in 2.6.17 or later:

- Turn on CONFIG_PNP and CONFIG_PNPACPI. Prior to 2.6.17, ACPI serial devices were discovered by 8250_acpi. In 2.6.17, 8250_acpi was replaced by the combination of 8250_pnp and CONFIG_PNPACPI.

[1] http://www.dig64.org/specifications/DIG64_PCDPv20.pdf
The table was originally defined as the "HCDP" for "Headless Console/Debug Port." The current version is the "PCDP" for "Primary Console and Debug Port Devices."

[2] The HP MP (management processor) is a PCI device that provides several UARTs. One of the UARTs is often used as a console; the EFI Boot Manager identifies it as "Acpi(HWP0002,700)/Pci(...)/Uart". The external connection is usually a 25-pin connector, and a special dongle converts that to three 9-pin connectors, one of which is labelled "Console."

[3] EFI console devices are configured using the EFI Boot Manager "Boot option maintenance" menu. You may have to interrupt the boot sequence to use this menu, and you will have to reset the box after changing console configuration.