TITLE: Writing Device Drivers - Plug and Play Basics
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The hardware changes necessary for an adapter to support Plug and
Play (PnP) are relatively minor, with the parts costing a total of
less than $5 per adapter. The actual hardware consists of a 72-bit
shift register, some non-volatile memory, and some tri-state
buffers. Use the 72-bit shift register to identify the particular
adapter. The register contains 32 bits of vendor data, 32 bits of
serial number and an 8-bit checksum. PnP adapters also contain
several bytes of configuration data stored in non-volatile RAM.
This data can be read and changed after you place the PnP card in
the configuration state.

A special set of registers on each PnP adapter, contained in a PnP
Applications Specific Integrated Circuit, or ASIC, provide access
to PnP cards and resource data. Even though the ISA bus is not
addressable, the PnP chipset provides for a method to isolate PnP
cards on the bus, one at a time, until all cards have been
identified. It does this by placing the adapter card in a low or
high impedance mode, depending on the data written to the card
and the contents of the LFSR on the adapter. Cards are isolated,
selected, and configured, then placed in a high impedance mode.
This allows one card to be selected and configured, then placed
into a high impedance mode so that it will no longer take part
in the iterative process of adapter isolation.

Two specific I/O ports have been reserved for PnP operation. The
first is 0x279, which is actually the printer status port, normally
a read-only register. The second is 0xa79, the printer status port
+0x800. These two ports provide accessibility to the PnP hardware
on each adapter using a special software sequence of reads and
writes to these ports. Use a third port to read data from and write
data to the card. This third port, however, is relocatable by the
PnP isolation software. The PnP specification defines that this
port should start at 0x203, but in practice, you should begin at
0x20B, since a standard joystick occupies the lower port addresses.
All PnP register I/O is performed using 8-bit transfers; 16-bit
transfers are not supported.

True Plug and Play support requires BIOS changes to detect and
configure PnP cards at boot time. Newer machines with Flash BIOS
should be easily modified; older machines with ROM BIOS are more
difficult. Upon bootup, the BIOS performs the isolation sequence
to ensure that the cards necessary for boot are enabled. It is
assumed that those cards will always remain active. In most cases,
this is accomplished by a single jumper or switch on the adapter
card. Cards that are in the active state do not take part in the
isolation sequence. If you insert a new card, the next time you
turn the machine on, the BIOS should perform an
auto-configuration sequence enabling the new card with acceptable
settings.

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