Adaptec AHA-1520/1522 SCSI driver for Linux (aha152x)

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In Revision 2 the driver was modified a lot (especially the bottom-half handler complete()).

The driver is much cleaner now, has support for the new error handling code in 2.3, produced less cpu load (much less polling loops), has slightly higher throughput (at least on my ancient test box; a i486/33Mhz/20MB).

Configuration Arguments

IOPORT	base io address	(0x340/0x140)
IRQ	interrupt level	(9-12; default 11)
SCSI_ID	scsi id of controller	(0-7; default 7)
RECONNECT	allow targets to disconnect from the bus	(0/1; default 1 [on])
PARITY	enable parity checking	(0/1; default 1 [on])
SYNCHRONOUS	enable synchronous transfers	(0/1; default 1 [on])
DELAY:	bus reset delay	(default 100)
EXT_TRANS:	enable extended translation (see NOTES)	(0/1: default 0 [off])

Compile Time Configuration

(go into AHA152X in drivers/scsi/Makefile):

- DAUTOCONF
  use configuration the controller reports (AHA-152x only)
- DSKIP_BIOSTEST
  Don't test for BIOS signature (AHA-1510 or disabled BIOS)
- DSETUP0="{ IOPORT, IRQ, SCSI_ID, RECONNECT, PARITY, SYNCHRONOUS, DELAY, EXT_TRANS }"
  override for the first controller
- DSETUP1="{ IOPORT, IRQ, SCSI_ID, RECONNECT, PARITY, SYNCHRONOUS, DELAY, EXT_TRANS }"
  override for the second controller
- DAHA152X_DEBUG
  enable debugging output
- DAHA152X_STAT
  enable some statistics

LILO Command Line Options

```
aha152x=<IOPORT>[,<IRQ>[,<SCSI-ID>[,<RECONNECT>[,<PARITY>[,<SYNCHRONOUS>[,<DELAY> [,<EXT_TRANS]]]]]]]
```

The normal configuration can be overridden by specifying a command line. When you do this, the BIOS test is skipped. Entered values have to be valid (known). Don't use values that aren't supported under normal operation. If you think that you need other values: contact me. For two controllers use the aha152x statement twice.

Symbols for Module Configuration

Choose from 2 alternatives:

1. specify everything (old):

```
aha152x=IOPORT,IRQ,SCSI_ID,RECONNECT,PARITY,SYNCHRONOUS,DELAY,EXT_TRANS
```

   configuration override for first controller

```
aha152x1=IOPORT,IRQ,SCSI_ID,RECONNECT,PARITY,SYNCHRONOUS,DELAY,EXT_TRANS
```

   configuration override for second controller

2. specify only what you need to (irq or io is required; new)

io=IOPORT0[,IOPORT1]
  IOPORT for first and second controller
irq=IRQ0[,IRQ1]
  IRQ for first and second controller

scsiid=SCSIID0[,SCSIID1]
SCSIID for first and second controller
reconnect=RECONNECT0[,RECONNECT1]
allow targets to disconnect for first and second controller
parity=PAR0[PAR1]
use parity for first and second controller
sync=SYNCHRONOUS0[,SYNCHRONOUS1]
enable synchronous transfers for first and second controller
delay=DELAY0[,DELAY1]
reset DELAY for first and second controller
exttrans=EXTTRANS0[,EXTTRANS1]
enable extended translation for first and second controller

If you use both alternatives the first will be taken.

Notes on EXT_TRANS

SCSI uses block numbers to address blocks/sectors on a device. The BIOS uses a cylinder/head/sector addressing scheme (C/H/S) scheme instead. DOS expects a BIOS or driver that understands this C/H/S addressing.

The number of cylinders/heads/sectors is called geometry and is required as base for requests in C/H/S addressing. SCSI only knows about the total capacity of disks in blocks (sectors).

Therefore the SCSI BIOS/DOS driver has to calculate a logical/virtual geometry just to be able to support that addressing scheme. The geometry returned by the SCSI BIOS is a pure calculation and has nothing to do with the real/physical geometry of the disk (which is usually irrelevant anyway).

Basically this has no impact at all on Linux, because it also uses block instead of C/H/S addressing. Unfortunately C/H/S addressing is also used in the partition table and therefore every operating system has to know the right geometry to be able to interpret it.

Moreover there are certain limitations to the C/H/S addressing scheme, namely the address space is limited to up to 255 heads, up to 63 sectors and a maximum of 1023 cylinders.

The AHA-1522 BIOS calculates the geometry by fixing the number of heads to 64, the number of sectors to 32 and by calculating the number of cylinders by dividing the capacity reported by the disk by 64*32 (1 MB). This is considered to be the default translation.

With respect to the limit of 1023 cylinders using C/H/S you can only address the first GB of your disk in the partition table. Therefore BIOSes of some newer controllers based on the AIC-6260/6360 support extended translation. This means that the BIOS uses 255 for heads, 63 for sectors and then divides the capacity of the disk by 255*63 (about 8 MB), as soon it sees a disk greater than 1 GB. That results in a maximum of about 8 GB addressable diskspace in the partition table (but there are already bigger disks out there today).

To make it even more complicated the translation mode might/might not be configurable in certain BIOS setups.

This driver does some more or less failsafe guessing to get the geometry right in most cases:

- for disks<1GB: use default translation (C/32/64)
- for disks>1GB:
  - take current geometry from the partition table (using scsicam_bios_param and accept only 'valid' geometries, ie. either (C/32/64) or (C/63/255)). This can be extended translation even if it's not enabled in the driver.
  - if that fails, take extended translation if enabled by override, kernel or module parameter, otherwise take default translation and ask the user for verification. This might on not yet partitioned disks.

References Used

"AIC-6260 SCSI Chip Specification", Adaptec Corporation.

"SCSI COMPUTER SYSTEM INTERFACE - 2 (SCSI-2)", X3T9.2/86-109 rev. 10h

"Writing a SCSI device driver for Linux", Rik Faith (faith@cs.unc.edu)

"Kernel Hacker's Guide", Michael K. Johnson (johnsonm@sunsite.unc.edu)

"Adaptec 1520/1522 User's Guide", Adaptec Corporation.

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