SCO Forum 2006

MOBILITY EVERYWHERE >

Presentation Title: Optimizing Your Hardware Investment
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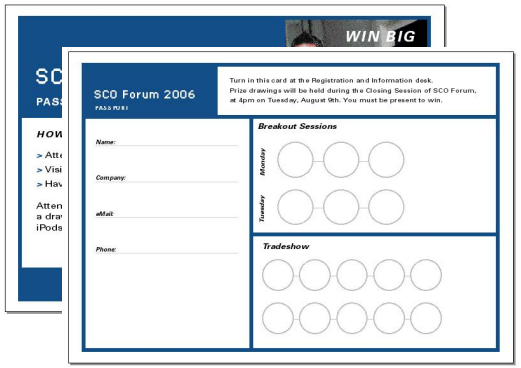
Session ID: 102

Get Your Passport Stamped

- Be sure to get your Passport stamped.
  - Get your passport stamped
    - By breakout session Room Monitor – **George Grindlinger**
    - By exhibitors in the exhibit hall
  - Turn in your Passport
    - After the last breakout session on Wednesday
    - Drawing for great prizes for Wrap-up Session
- Remember to complete the breakout session evaluation form, too



Agenda

1. What's New – Hardware-wise?
2. Last Years Certifications
3. Industry Inflection Points
    1. Dual-Core
    2. Parallel to Serial Storage
4. SATA Feature Comparison
5. Resolving the Confusion
    1. SATA Architecture & Roller Coasters
    2. SAS-SATA Compared
6. New SCO Storage Drivers
    1. SAS
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    3. SCO Disk Mirroring Software, and SCOs On-Line Data Manager
7. Bibliography

What's New Hardware-wise?

What's New?

- 4Front Sound drivers
  - Currently available for UnixWare 7.1.4, and OpenServer 5.0.7
  - OpenServer 6 availability in acceptance testing – coming this Fall
  - Available via contract only
  - Site License based on contracted number of deployments
- HP StorageWorks - MSA1500cs certified on SCO with Active/Active failover [OSR6, UW7.1.4 only]
  - Active/Active support coming soon for the MSA1000

What's New?

- New USB Stacks for UnixWare 7.1.4, OpenServer 6, and OpenServer 5.0.7
  - Unified USB Stacks for OpenServer 6, UnixWare 7.1.4, and OpenServer 5.0.7
  - New Communications class driver for Modems that support CDC/ACM protocols
  - Works with some serial devices, like The Magellan Explorist – will transmit to a computer via USB position and time data

What's New?

- Adaptec 'adp94xx' SAS Driver w/HostRAID™ support
- LSI Logic MegaRAID SAS driver in Beta

  [See "Optomizing your Hardware Investments," Break-Out session on Monday at 1:30pm]
- New Port Adapters – Parallel Cards for OSR6 PCI, PCI-E from Axxion Computer Corp. for OpenServer 6
- Dialogic Telephony drivers released

Hardware Certifications 2005-2006

Hardware Count - 7/1/2005 - 6/30-2006

Computer System Total - 420

Certified on:

OpenServer 6 - 151
UnixWare 7.1.4 - 125
OpenServer 5.0.7 - 78
UnixWare 7.1.3 - 43
Older SCO OSs - 23

Peripheral Hardware by Category

Network Interface Cards & chip sets ..... - 673
Storage Controllers ..... - 307
Port Adapters ..... - 229
Telcom products ..... - 150

Industry Inflection Points

Industry Inflection Points

Industry inflection points for new technologies are highly disruptive for:

- Computer Industry OEMs, OSVs, IHVs and ISVs
- Distis, VARs, Resellers and other channel partners
- The whole supply chain

But most importantly – For Customers

Today, we are going through 2 significant inflection points

- Multi-core processors
- A change from Parallel storage technologies to Serial
  - Not to mention HostRAID, (or) Software RAID on-board chip sets

Industry Inflection Points

- Multi-Processor Cores
  - Not highly disruptive
  - Are available with all SCO shipping OS products
  - SCO Hardware Database changes make this easier to understand for customers and channel partners
- Parallel To Serial storage controllers, plus the introduction of Software RAID
  - Highly disruptive
  - This technology will not standardize (in practice) for another 18 months… Maybe longer

Parallel to Serial Storage Inflection Point

- Serial Attached SCSI (SAS), replaces Parallel SCSI
- Serial-ATA (SATA), replaces Parallel ATA (IDE)

BUT

- Both new Serial Technologies use <u>almost</u> identical connectors – with Parallel ATA, and SCSI– they didn't

The Difference?

SATA connectors from disk drives can connect to SAS host adapters, but SAS disk drive connectors will not work with SATA host adapters - there are connector keys that prevent this

Parallel to Serial Storage Inflection Point

So why am I wasting your time telling you something that you already know?

Simple – Because of the HostRAID (or the) Software RAID issue

Parallel to Serial Storage – Software RAID

Some Terminology

- HostRAID™ is Adaptec's trademarked 'name' for Software RAID
- When I use the term "Software RAID", I am referring to Adaptec HostRAID, Software RAID from other vendors like LSI, and yes… even SCO
- SCO has software RAID Products
  - SCO Disk Mirroring (RAID 0) - $99 USD List
  - SCO Online Data Management (RAID 0, 1, 5, and 10) - $349 USD List

Parallel to Serial Storage – Software RAID

Software RAID uses the computers system CPU for handling the RAID storage – This slows system performance

Hardware RAID uses the hardware on the host controller (not the system CPU) to handle RAID storage – This does not affect system performance

What I want you to wrap your arms around is this

The SCO device driver 'adp94xx,' functional with Adaptec HostRAID is only available for **Adaptec SAS Host Controllers** supported by the SCO driver.

Both SAS and SATA drives can be used with this driver and the Adaptec chips and peripherals it supports

However, using SATA drives with **ANY SATA** chip set or peripheral will not allow any kind of Software RAID Functionality period.

Parallel to Serial Storage – Software RAID

Question: What if the computer system my customer wants to use, comes with a Software RAID chip, or peripheral and my customer wants RAID support?

Answer: If the Adaptec chip set or peripheral in the computer uses the Adaptec 'adp94xx' driver – it will work. If it does not – consider using SCO 'Disk Mirroring software,' or the 'SCO Online Data Manager."

Parallel to Serial Storage – Software RAID

Question: Why doesn't SCO support ALL Software RAID chip sets and controllers?

The Simple Answer:

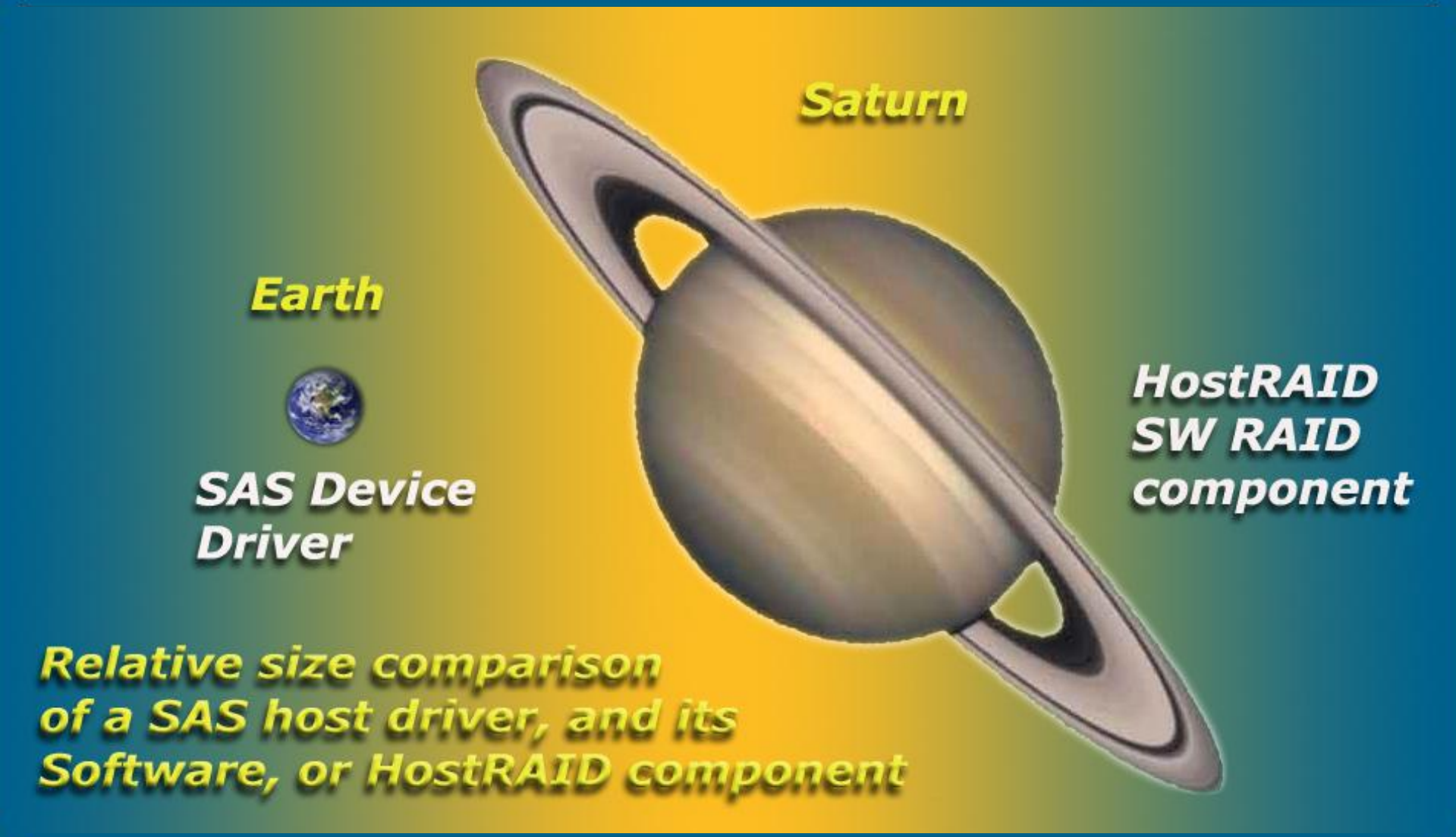
- For an IHV to port just the Software RAID stack to any driver is in itself a huge effort.
- SCO 'generally' is supplied all device drivers, and management software from our IHV and OEM partners.
- With this parallel to serial change in the industry – ALL storage drivers, management software, and Software RAID had to be completely created from scratch for all OSVs.
- Nobody in this industry today has enough staff to complete the work concurrent with hardware product release.

Parallel to Serial Storage – Software RAID

Question: Come on SCO… how difficult is this really?

Answer: Let me change the slide here…

95% of the driver is Host-or SW RAID Code



Parallel to Serial Storage – Software RAID

To have these devices in-time for general availability of SAS devices – SCO Worked with Adaptec and LSI to share the work load

SCO will spend @ 5-months development and testing for one storage driver- that's just the driver.

Some Storage IHVs are now in the software business, obtaining a majority of their revenue by selling software to the OEMs

To protect themselves, IHVs are not making some code available to OSVs – especially SATA

If they did, since the code is so generic, it would allow other IHVs chip sets to work

Parallel to Serial Storage – SATA

SATA host controllers

SATA will use generic drivers as time goes by

Right now – most IHVs are rolling their own… especially for the desktop market

SCO created the 'ahci' driver to take care of the server side, and even some others

Trouble is, some OEMs are not electing to enable AHCI chipsets to use this driver due to royalty costs

Due to customer pressure, more of them will enable ahci in the future

Parallel to Serial Storage – SATA

- The 'ahci' driver is available for UnixWare and OpenServer 6
- For OpenServer 5.0.7 a new 'wd' driver will permit use of most SATA host controllers
- This will be released in MP5 scheduled for July 31, 2006
- Concurrent with the release of this driver, many more OEM Platform Certifications will become available for OpenServer 5.0.7.
- Remember, the 'ahci' driver will work for most SATA chip sets and peripherals – however – While the chip set or peripheral can work – the Software RAID functionality, will not work

SATA Feature Comparison

SATA has been a Nemesis

SATA Realities

SATA has:

- turned us all every which way – especially upside down from time-to-time
- created a lot of channel confusion
- created even more customer confusion

Nemesis – the adjacent roller coaster has:

- just been insulted
- a ride time of 2 minutes 55 seconds, as opposed to months for SATA.
- Nemesis is an awesome ride

SATA II .vs. SATA

- Hot Plug
- Native Command Queuing
- Staggered Spinup
- Power Management
- External SATA
- 3 GB/s Interconnect

All of these enhancements to SATA are optional.

Comparison: Storage Interface Features

Table I - Storage Interface Feature Comparisons

	ATA	SATA	SCSI	SAS	FC
Interface Type	Parallel	Serial	Parallel	Serial	Serial
Addressing	2	1 or 16 w/SATA II	16	128	16 million
Distance (m)	.5	1	12	10	10km
Connection	80-pin	7-pin	68-pin internal/ext	7-pin	copper/optical internal/external
Dual Port	no	no	no	yes	yes
Topology	bus	pt. to pt.	bus	pt. to pt. with expanders	loop, fabric
Duplex	half	half	half	full	full
Max. Devices	2	1 or 15 with port multiplier	16	4096 with expanders	127-loop 2*24 fabric
Cable Length	0.4m	1m	12m	10m	30m (copper) 300m (optical)
Applications	Internal Storage	ATA RAID, Server & high-end work-station storage	Mid-range & Enterprise servers	Mid-range and Enterprise servers	SAN and Enterprise servers

Source: LSI Logic

SAS .vs. SATA

	SAS	SATA	benefit
price	$3-$5/GB	$.3-$.5/GB	Price point
availability	24x7	8x5	reliability
bandwidth	3G -> 6G	1.5G -> 3G	speed
rotation	10K-15K	5.4K-7.2K	speed
cache	16M typ.	8M typ.	speed
queuing	256	32	speed
targets	128	16	space
expansion	128 exp.	16 pm.	space

Table II - SATA I to SATA II

SATA I Features	SATA II Phase I Features	SATA II Phase II Features
100% software compatibilty	Native Command Queuing (NCQ)	Dual host active fail over
Thinner Serial ATA cables up to one meter	SES and SAF-TE enclosure management	Efficient connectivity to a large number of drives
Lower pin counts, and support for lower voltage	Backplane interconnect providing extended trace lengths	3.0Gb (300 MB/s)
Connectors can be blind-mated and hot-plugged	Data scatter/gathering	
Lower power requirements		

Resolving the Confusion

SATA Conclusions

The answer to SATA is more complex than anticipated

- Essentially, the issue breaks down into the following categories:

1. **Legacy IDE** – SATA devices running electrically as SATA but driven by PATA driver. Slow 100-130Mb/sec. Legacy driver.
2. **Enhanced IDE** – A few more features, still using PATA driver. 150Mb/sec – New "wd" (OSR5.0.7) and "ide" driver (UW7.1.4)
3. **Proprietary** – Special, very inexpensive devices from Promise, Marvel, Silicon Image, 3Ware, and Broadcom – In some cases like the SiI 3112, the device will work, just not with the SW RAID component.
4. **Customers requiring SATA drives and HostRAID** can be accomplished using a SAS HBA like the Adaptec 48300 (ZipZoomfly cost $199) could be a solution.

SATA Conclusions

- The matrix to answer the question, “what works?” would be a three dimensional array, and still difficult at best.
- The reasons are straightforward, but the answer to: “Will this specific device work?” is not.
  - Factors
    - Customer requirements: Are they willing to run SATA at IDE Speeds, or do they want 3Gb/sec?
    - Available Computer BIOS Settings
    - There is a bit in some SATA Hosts that can make that Host AHCI Compliant, however the OEM an elect not to throw that bit. (HP is a prime example)
    - AHCI was intended by Intel to be the replacement for PATA drivers. This is not universal for several reasons, and many inexpensive devices are very proprietary. AHCI is available in UW7.1.4, and OSR6 – NOT 5.0.7.
    - OSR 5.0.7 is frozen at EIDE or Legacy IDE for running SATA devices if the System BIOS can be set for this functionality.
    - Additionally, some SATA hosts can be configured several ways

Why is my SATA only IDE?

- SATA Controller Variations:
  - Native SATA
    - Native SATA controllers need a special driver
    - AHCI is just one implementation of Native SATA
    - Most of the IHV vendors have their own Native SATA implementation – check SCO Driver Download Website
  - Enhanced or Legacy Mode
    - SATA PHY but IDE controller internally
    - HBA will use the 'ide' or 'wd' driver
    - **Check the BIOS** to see if you can switch to AHCI which will then allow the AHCI driver to control it

SATA Architecture?

ROAR – Six Flags, Marine World – Vallejo, CA

SATA Architecture

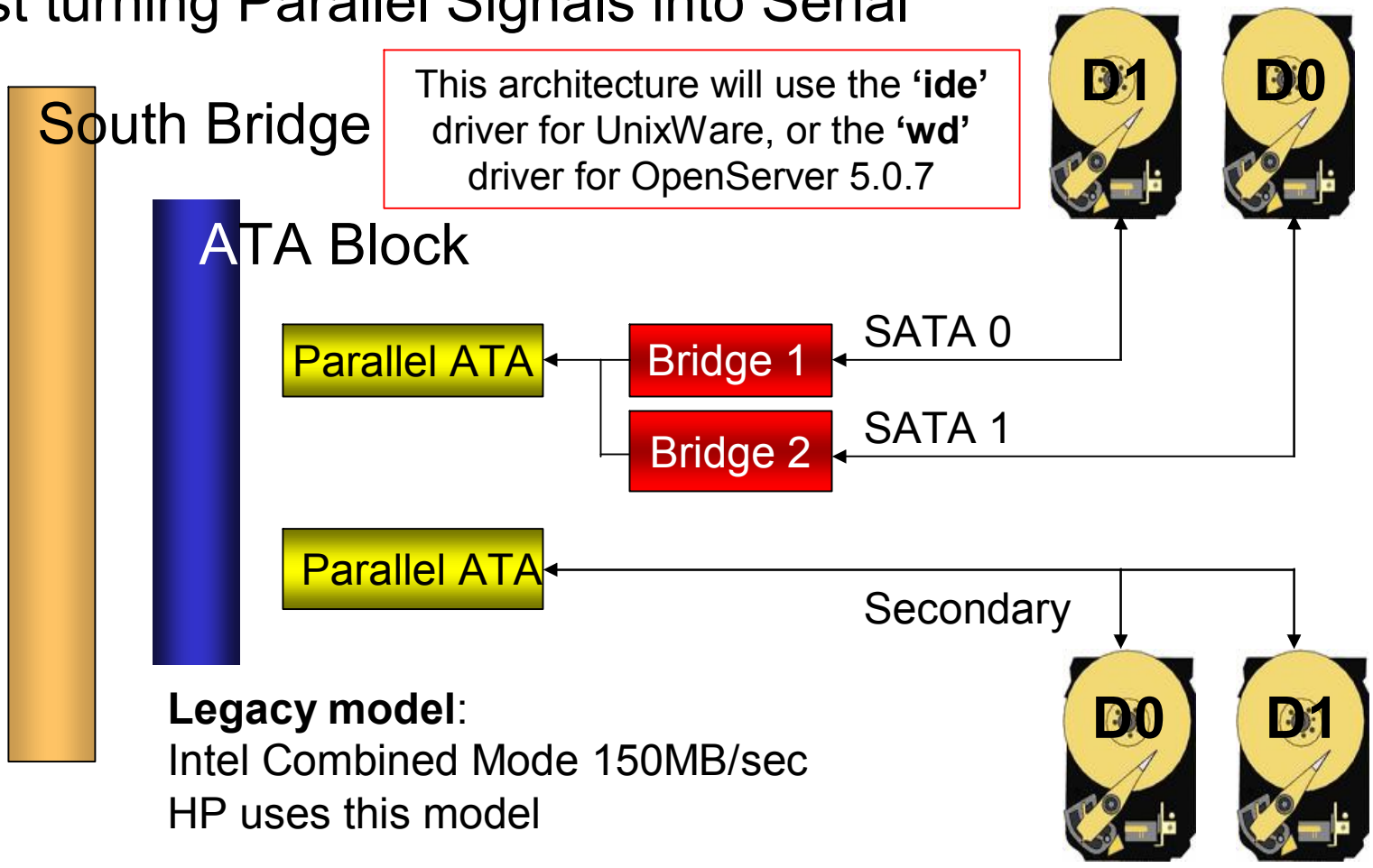
SATA Architecture today is more convoluted than the roller coaster below - The reasons are:

- Some manufacturers are treating SATA as a generic replacement for IDE
- While others are treating SATA like a new breed of host controller
- And others are creating chip sets and software that are very inexpensive to capture market share

We will show the primary architectures in the next slides

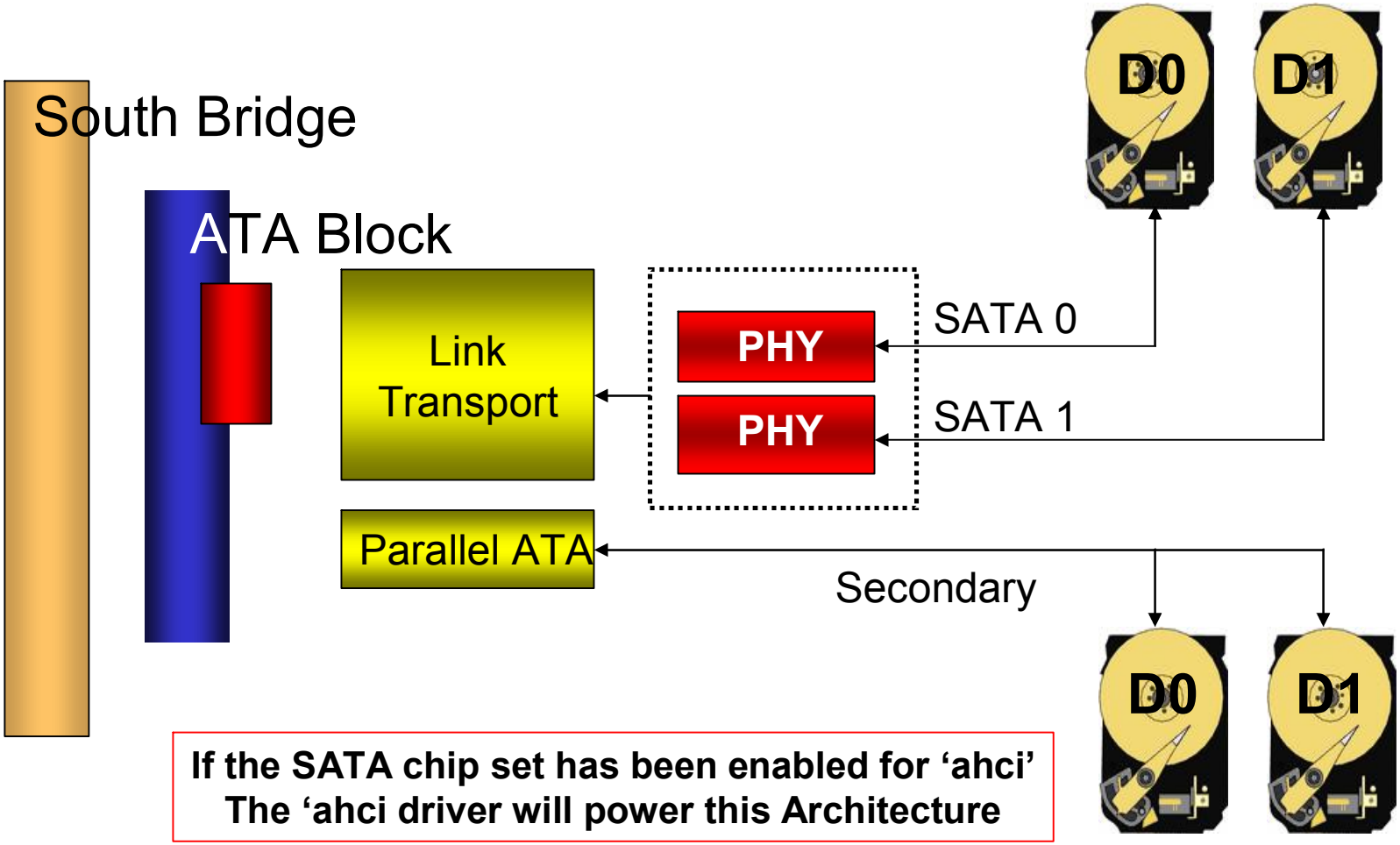
SATA Legacy Model

Just turning Parallel Signals into Serial



Legacy model:
Intel Combined Mode 150MB/sec
HP uses this model

SATA Architecture for 3GB/sec



If the SATA chip set has been enabled for 'ahci'
The 'ahci driver will power this Architecture

Serial Attached SCSI
Serial-ATA
Comparison

Comparison: SATA – SAS - FC

	Serial ATA	Serial Attached SCSI	Fibre Channel AL
Performance	Half-duplex	Full-duplex with wide links	Full-duplex
	1.5 Gbits/second (next step 3.0 Gb/sec)	3.0 Gbits/second (next step 6.0 Gb/sec)	2.0 Gbits/second (next step 4 Gb/sec)
Connectivity	1-meter internal cable	>6-m external cable	>15-m external cable
	One device (fan-out devices demo'd)	>128 devices (expanders)	127 devices (loop or loop switch)
	SATA devices	SAS and SATA devices	FC devices only
Availability	Single-port HDDs	Dual-port HDDs	Dual-port HDDs
	Single-host	Multi-initiator	Multi-initiator
Driver model	Software transparent with parallel ATA	Software transparent with parallel SCSI	Software transparent with parallel SCSI

Source: LSI Logic

Mixing SATA & SAS

- SAS supports mixing SAS drives and SATA drives on a controller
- There is no performance penalty
- Our supported solutions don't require an expander for SATA drive support
- Populate your SAS controller w/SATA drives until you need the benefits of SAS

New Storage Drivers From SCO

SAS Support

- Adaptec SAS driver w/HostRAID available now
  - Adaptec Storage Manager available 3rd qtr
- LSI MPT-Fusion (SAS) available now
- LSI MegaRAID (SAS) available 3rd qtr
  - MegaRAID Storage Manager available 3rd qtr

SATA II Support

- AHCI driver for OSR6 & UW7
  - Supports Native Command Queuing
  - Supports Hot Plug
  - Supports Staggered Spin-Up
  - No power management
  - No support for port multipliers
- 'wd' driver
  - Supported for OpenServer 5.0.7
  - Same functionality as the 'ide' driver for UnixWare

ODM vs. Hardware RAID

Online Data Manager - is a cost-effective storage management solution for high availability and online volume management. It provides software RAID Levels 0, 1, 5, 10 (striping, mirroring, striping with distributed parity and striped mirroring) as well as disk spanning capabilities. It includes a graphical Visual Administrator for exceptional ease-of-use and supports online file systems resizing, migrations and RAID level modifications.

Disk Mirroring - provides increased data availability by providing fault tolerance against disk failures and faster access via software RAID Level 1 (simple disk mirroring). By adding a second disk to the system and enabling Disk Mirroring, administrators will automatically have access to their business critical data should one disk fail. Designed to work with off-the-shelf disk storage subsystems, Disk Mirroring provides a very cost effective high availability data storage solution.

ODM vs. Hardware RAID

- Excellent substitute for any Software RAID device driver
- Available for OpenServer 6, and UnixWare 7
- Lower cost than HW RAID
- Comparable reliability
- Slightly slower performance because of dependence on system CPU
- Very competitively priced

Your Hosts

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Appendix: Bibliography

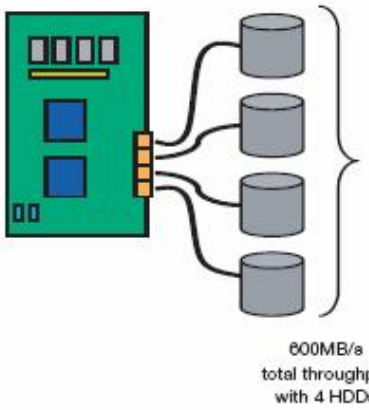
LSI Reference:

http://www.lsi.com/files/docs/marketing_docs/storage_stand_prod/Technology/SATA_II_White_Paper.pdf

EXTRA SLIDES

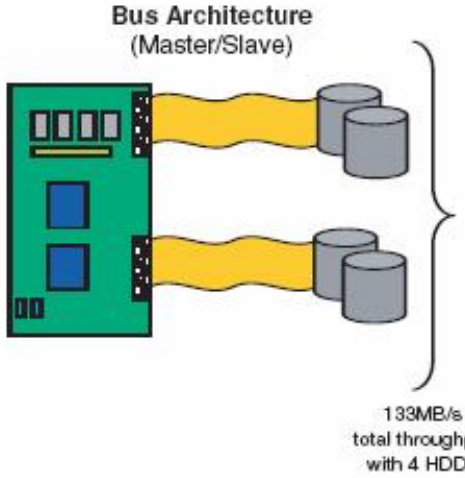
SATA vs: ATA (IDE)

SATA



- Serial ATA is a point-to-point interface used to connect storage devices such as hard disks, DVD, and CD-RW drives to the PC motherboard
- Serial ATA delivers a scalable interface solution supporting severa speed doublings to address the needs of future storage devices
- Directly connected to the host via a dedicated link – entire interface bandwidth dedicated to it with no interaction between devices.
- Eliminates overhead associated wi coordinating accesses between the master and slave device sharing the same cable

ATA (IDE)



- Supports faster burst rates of 133 MB/sec
- Up to 2 devices per bus (PCs typically have 2 and often 4 ATA buses)
- ATA 66/100/133 require relatively short (18 inches) ribbon cabling, precluding IDE devices being external to the computer