

AccessionIndex: TCD-SCSS-T.20141120.003

Accession Date: 20-Nov-2014

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Object name: csTCDie Grid-Ireland SCI Cluster

Vintage: c.1999

Synopsis: 16-node cluster using 400MB/s SCI switched interconnect, the third cluster constructed in the Department of Computer Science, Trinity College Dublin.

Description:

This cluster was the third-generation cluster constructed in the Department of Computer Science, Trinity College Dublin, essentially a superset of a *Beowulf* cluster [1]. This 16-node cluster represented the major resource for Grid-Ireland in the period 1999-2009, with its interconnect serving two generations of compute nodes.

In fact it had two interconnects. A primary 100Mbps switched Ethernet interconnect provided all the normal networking and supported Beowulf-style clustering. A second high-speed network used the ANSI/IEEE 1596-1992 Scalable Coherent Interconnect (SCI) technology to allow high-performance (i.e. 400MB/s) message passing for parallelised applications, originally via PVM, later via the SCI-enabled MPI from Univ.Aachen. That the cluster had such a long life was largely due to a mid-life upgrade of this SCI interconnect and the compute nodes.

The initial c.1999 SCI interconnect was a simple ringlet topology connecting sixteen Dolphin D310 PCI cards that contained Dolphin's LC2 SCI controller. Later the network was upgraded to incorporate six Dolphin D515 SCI switches wired in a 2-stage Clos switch topology connecting sixteen Dolphin D521 PCI cards that contained Dolphin's more advanced LC3 SCI controller.

The initial compute cluster nodes had << ??? >> motherboards. The motherboards of compute nodes were then replaced by 16 new machines with Serverworks dual-CPU motherboards.

Structurally there were two clusters, one of compute nodes, the other of two identical storage servers (in principle as a fail-over pair, but never operationally).

While the two identical storage cluster servers connected to opposite ends of five 16-bit SCSI-II strings of RAID-10 35-disk arrays via Vortex SCSI RAID Controllers, one server also connected via differential SCSI to an NCR RAID Controller for five 8-bit SCSI-I strings in a RAID-3 35-disk array used for video. This structure was conceptually straightforward, but not easy to maintain in service, a constant worry regarding potential data loss, although that never happened.

The storage cluster incorporated three large RAID chassis housing 35 disks that were designed and constructed in the Dept.Computer Science, TCD. The chassis of the two RAID-10 subsystems were originally constructed in the early 1990s for the Tolsys Stable Disk, see elsewhere in the collection, while the RAID-3 subsystem was actually the very first of this series of large RAID subsystems, later repurposed with its own host server as a fully independent RAID-3 subsystem, again see elsewhere in this catalog.

None of the compute nodes still exist. However, the switched SCI interconnect plus a set of SCI controller cards, which jointly are perhaps the most interesting subsystems of the cluster, have been retained in this collection. The two Vortex RAID controllers also have been retained. Furthermore the RAID-3 subsystem, yet another very interesting subsystem, has been retained, see elsewhere in this collection. The custom-made shelving units have also been retained and used as shelving for part of the collection.

The homepage for this catalog is at: <https://www.scss.tcd.ie/SCSSTreasuresCatalog/>
Click '*Accession Index*' (1st column listed) for related folder, or '*About*' for further guidance.
Some of the items below may be more properly part of other categories of this catalog, but are listed here for convenience.

Accession Index	Object with Identification
TCD-SCSS-T.20141120.003	csTCDie Grid-Ireland SCI Cluster, 16-node cluster using 400MB/s SCI switched interconnect, the third cluster constructed in the Department of Computer Science, Trinity College Dublin, c.1999.
TCD-SCSS-T.20141120.003.01	Vortex RAID Controller. S/N:
TCD-SCSS-T.20141120.003.02	Vortex RAID Controller. S/N:
TCD-SCSS-T.20141120.003.03	Dolphin D515 SCI Switch (listed front LHS top-to-bottom). S/N: D515-BD-000074
TCD-SCSS-T.20141120.003.04	Dolphin D515 SCI Switch. S/N: D515-BD-000088
TCD-SCSS-T.20141120.003.05	Dolphin D515 SCI Switch. S/N: D515-BD-000094
TCD-SCSS-T.20141120.003.06	Dolphin D515 SCI Switch (listed front RHS top-to-bottom). S/N: D515-BD-000097
TCD-SCSS-T.20141120.003.07	Dolphin D515 SCI Switch. S/N: D515-BD-000098
TCD-SCSS-T.20141120.003.08	Dolphin D515 SCI Switch. S/N: D515-BD-000079
TCD-SCSS-T.20141120.003.09	Dolphin D321 PCI64-2 ANSI/IEEE 1596-1992 Scalable Coherent Interface (SCI) Card, 800MB/s LVDS cache-coherent LC3 SCI controller, 33MHz 64/32-bit 120MB/s PSB PCI 2.2 interface. S/N: D321-BB-000373.
TCD-SCSS-T.20141120.003.10	Dolphin D321 PCI64-2 ANSI/IEEE 1596-1992 Scalable Coherent Interface (SCI) Card, 800MB/s LVDS cache-coherent LC3 SCI controller, 33MHz 64/32-bit 120MB/s PSB PCI 2.2 interface. S/N: D321-BB-000374.
TCD-SCSS-T.20141120.003.11	Dolphin D321 PCI64-2 ANSI/IEEE 1596-1992 Scalable Coherent Interface (SCI) Card, 800MB/s LVDS cache-coherent LC3 SCI controller, 33MHz 64/32-bit 120MB/s PSB PCI 2.2 interface. S/N: D321-BB-000375.

TCD-SCSS-T.20141120.003.12	Dolphin D321 PCI64-2 ANSI/IEEE 1596-1992 Scalable Coherent Interface (SCI) Card, 800MB/s LVDS cache-coherent LC3 SCI controller, 33MHz 64/32-bit 120MB/s PSB PCI 2.2 interface. S/N: D321-BB-000376.
TCD-SCSS-T.20141120.003.13	Dolphin D321 PCI64-2 ANSI/IEEE 1596-1992 Scalable Coherent Interface (SCI) Card, 800MB/s LVDS cache-coherent LC3 SCI controller, 33MHz 64/32-bit 120MB/s PSB PCI 2.2 interface. S/N: D321-BB-000377.
TCD-SCSS-T.20141120.003.14	Dolphin D321 PCI64-2 ANSI/IEEE 1596-1992 Scalable Coherent Interface (SCI) Card, 800MB/s LVDS cache-coherent LC3 SCI controller, 33MHz 64/32-bit 120MB/s PSB PCI 2.2 interface. S/N: D321-BB-000379.
TCD-SCSS-T.20141120.003.15	Dolphin D321 PCI64-2 ANSI/IEEE 1596-1992 Scalable Coherent Interface (SCI) Card, 800MB/s LVDS cache-coherent LC3 SCI controller, 33MHz 64/32-bit 120MB/s PSB PCI 2.2 interface. S/N: D321-BB-000381.
TCD-SCSS-T.20141120.003.16	Dolphin D321 PCI64-2 ANSI/IEEE 1596-1992 Scalable Coherent Interface (SCI) Card, 800MB/s LVDS cache-coherent LC3 SCI controller, 33MHz 64/32-bit 120MB/s PSB PCI 2.2 interface. S/N: D321-BB-000382.
TCD-SCSS-T.20141120.003.17	Dolphin D321 PCI64-2 ANSI/IEEE 1596-1992 Scalable Coherent Interface (SCI) Card, 800MB/s LVDS cache-coherent LC3 SCI controller, 33MHz 64/32-bit 120MB/s PSB PCI 2.2 interface. S/N: D321-BB-000383.
TCD-SCSS-T.20141120.003.18	Dolphin D321 PCI64-2 ANSI/IEEE 1596-1992 Scalable Coherent Interface (SCI) Card, 800MB/s LVDS cache-coherent LC3 SCI controller, 33MHz 64/32-bit 120MB/s PSB PCI 2.2 interface. S/N: D321-BB-000385.
TCD-SCSS-T.20141120.003.19	Dolphin D321 PCI64-2 ANSI/IEEE 1596-1992 Scalable Coherent Interface (SCI) Card, 800MB/s LVDS cache-coherent LC3 SCI controller, 33MHz 64/32-bit 120MB/s PSB PCI 2.2 interface. S/N: D321-BB-000388.
TCD-SCSS-T.20141120.003.20	Dolphin D321 PCI64-2 ANSI/IEEE 1596-1992 Scalable Coherent Interface (SCI) Card, 800MB/s LVDS cache-coherent LC3 SCI controller, 33MHz 64/32-bit 120MB/s PSB PCI 2.2 interface. S/N: D321-BB-000389.
TCD-SCSS-T.20141120.003.21	Dolphin D321 PCI64-2 ANSI/IEEE 1596-1992 Scalable Coherent Interface (SCI) Card, 800MB/s LVDS cache-coherent LC3 SCI controller, 33MHz 64/32-bit 120MB/s PSB PCI 2.2 interface. S/N: D321-BB-000401.
TCD-SCSS-T.20141120.003.22	Dolphin D321 PCI64-2 ANSI/IEEE 1596-1992 Scalable Coherent Interface (SCI) Card, 800MB/s LVDS cache-coherent LC3 SCI controller, 33MHz 64/32-bit 120MB/s PSB PCI 2.2 interface. S/N: D321-BB-000402.
TCD-SCSS-T.20121208.094	Experimental SCSI Cluster, 4-node prototype cluster using SCSI as interconnect, the first cluster constructed in the Department of Computer Science, Trinity College Dublin, and second cluster constructed in the Republic of Ireland, 1997.
TCD-SCSS-T.20121208.095	csTCDie Beowulf Cluster, Departmental cluster using 100Mbps Ethernet as interconnect, the second cluster

	constructed in the Department of Computer Science, Trinity College Dublin, 1998.
TCD-SCSS-T.20121208.097	VRengine, 9-node virtual reality engine using 600MB/s SCI 2-d toroidal interconnect, c.2005.
TCD-SCSS-T.20121208.098	csTCDie Grid Site Beowulf Clusters and Datastore, Complex of clusters & storage (1500 cores/600 TB) using 1Gbps Ethernet interconnect and 10Gbps backbone, participant in DataGrid, EGEE, EGI, and CERN LHC computing. From 2013 repurposed as SCSS Cloud, c.2009.
TCD-SCSS-T.20121208.106	csTCDie PS3 Cluster, Ten nodes from a 16-node Sony Playstation PS3 cluster plus build machine, using 1Gbps Ethernet interconnect and running Yellow Dog Linux, c.2009.
TCD-SCSS-T.20121208.099	csTCDie GPU Cluster, 64-core/32-GPU/16-node cluster using 1Gbps Ethernet interconnect, c.2011.

References:

1. Wikipedia, *Beowulf cluster*, see:
https://en.wikipedia.org/wiki/Beowulf_cluster
Last browsed to on 30-May-2023.

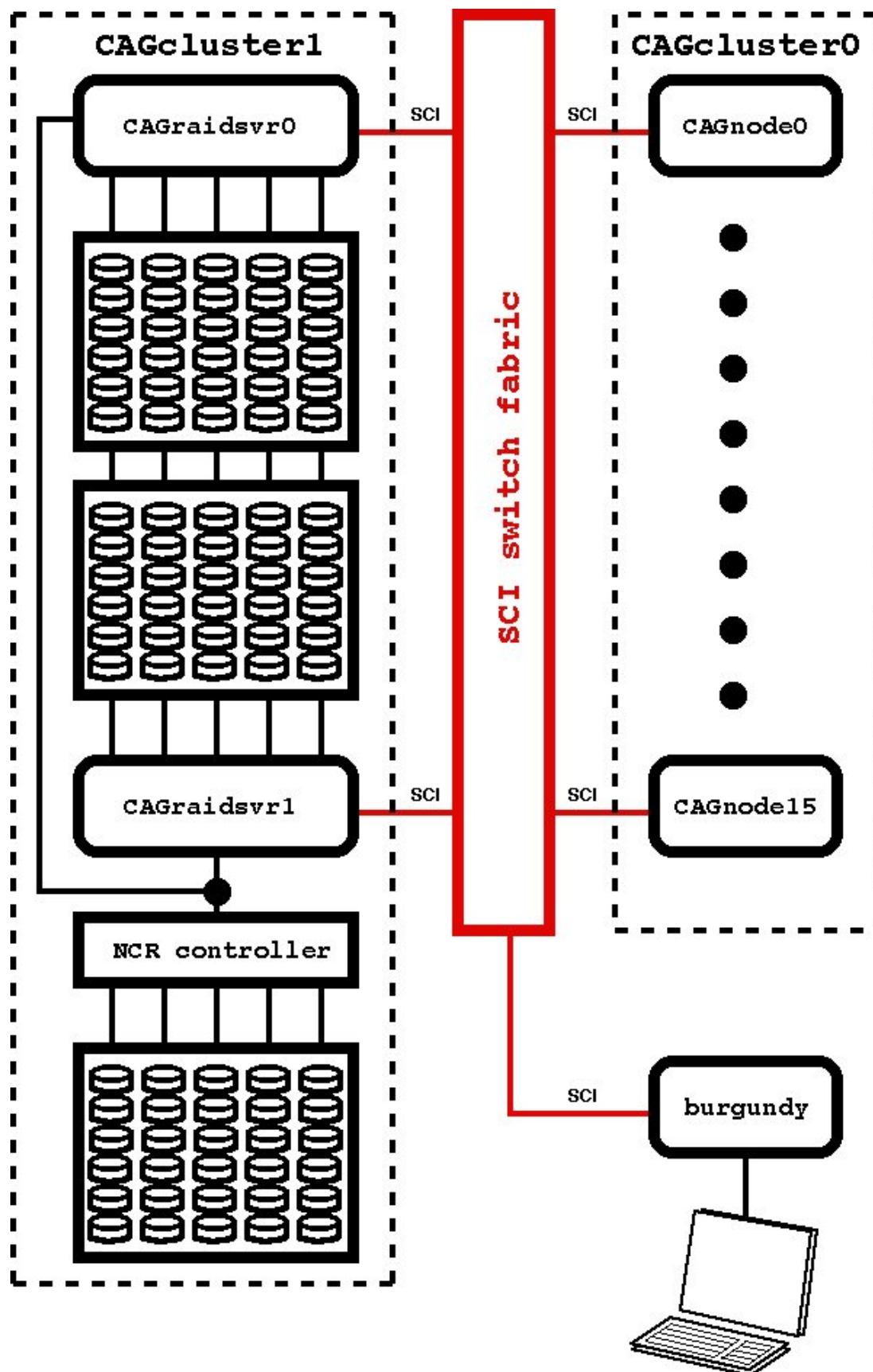


Figure 1: csTCDie Grid-Ireland SCI Cluster architecture



Figure 2: CAGcluster0 front view



Figure 3: CAGcluster0 front closeup showing SCI switches



Figure 4: CAGcluster0 rear view showing SCI and Ethernet wiring



Figure 5: CAGcluster0 SCI switches after removal, again showing SCI wiring

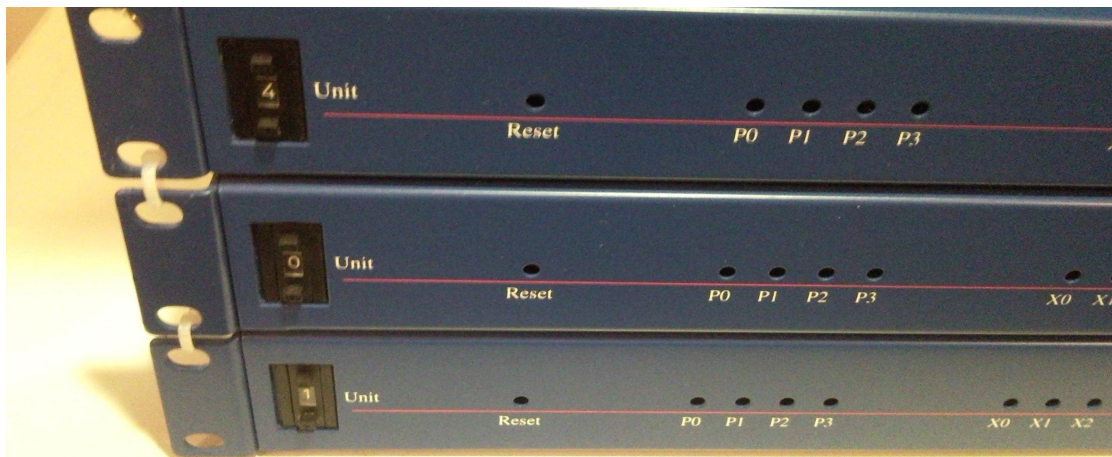


Figure 6: CAGcluster0 SCI switches closeup

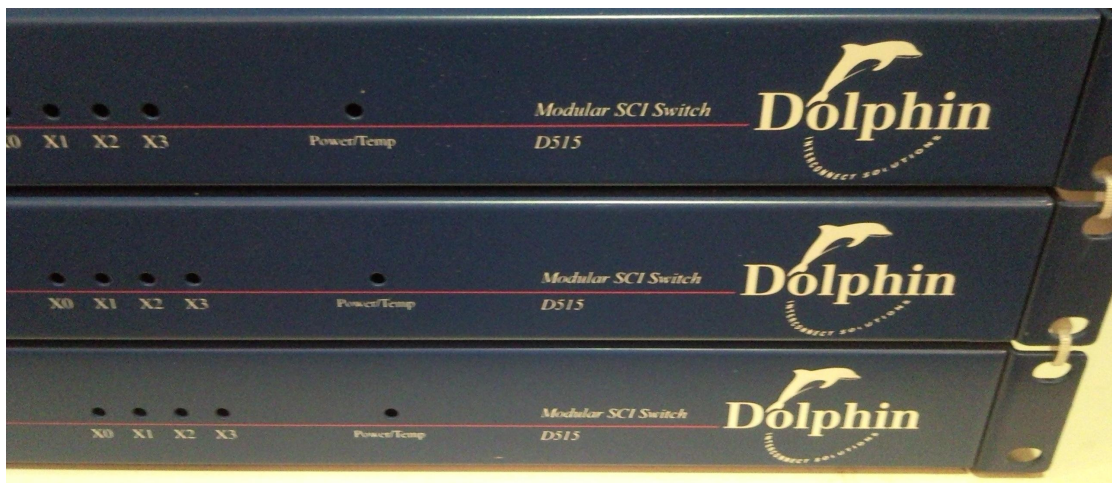


Figure 7: CAGcluster0 SCI switches closeup



Figure 8: CAGcluster0 SCI switches after removal, rear closeup

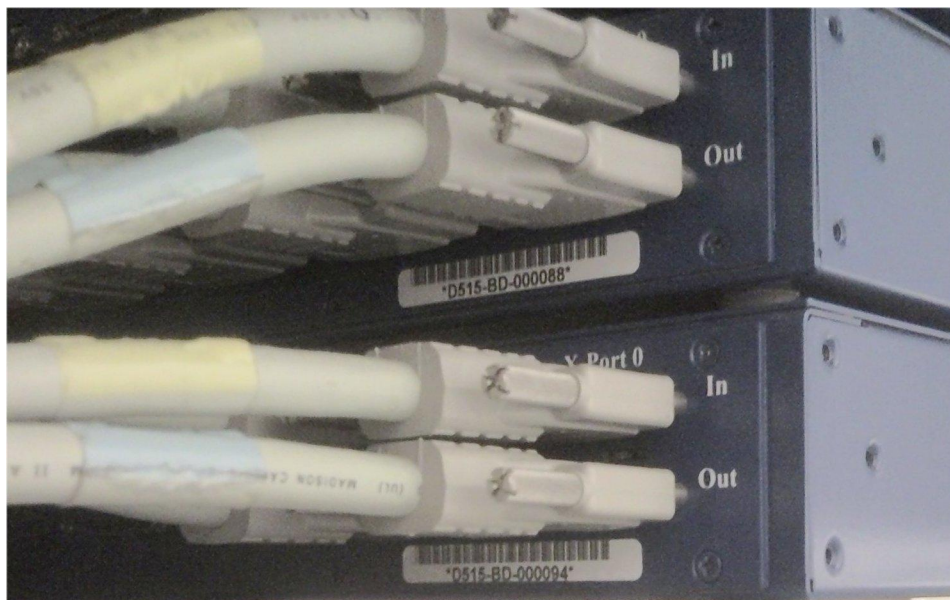


Figure 9: CAGcluster0 SCI switches after removal, rear closeup



Figure 10: CAGcluster1 cagraidsvr0 front view



Figure 11: CAGcluster1 cagraidsvr1 front view

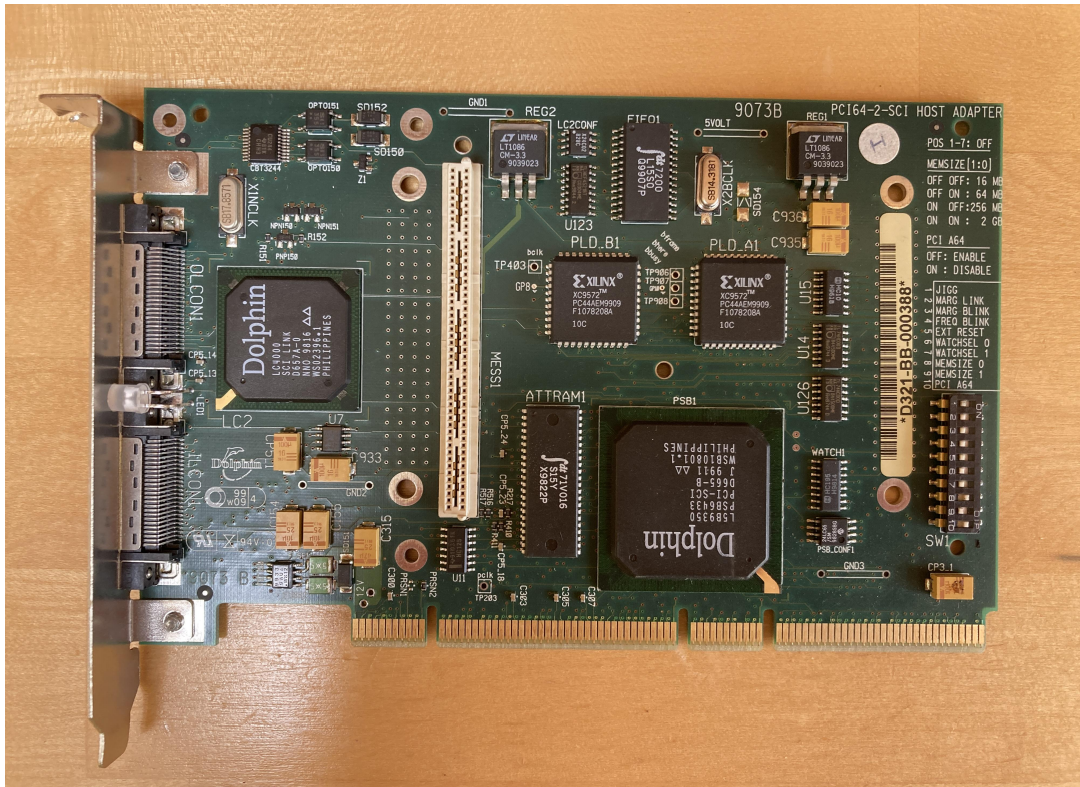


Figure 12: Dolphin D321 PCI64-2 ANSI/IEEE 1596-1992 Scalable Coherent Interface (SCI) Card, top view

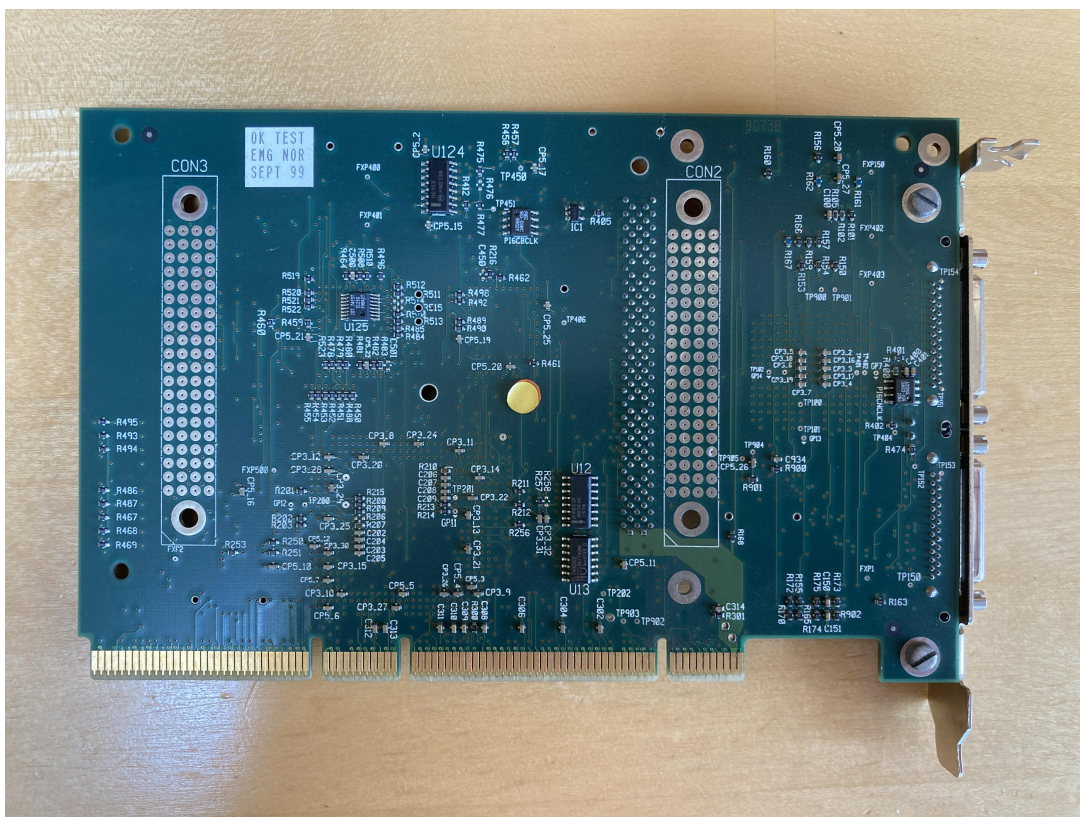


Figure 13: Dolphin D321 PCI64-2 ANSI/IEEE 1596-1992 Scalable Coherent Interface (SCI) Card, bottom view

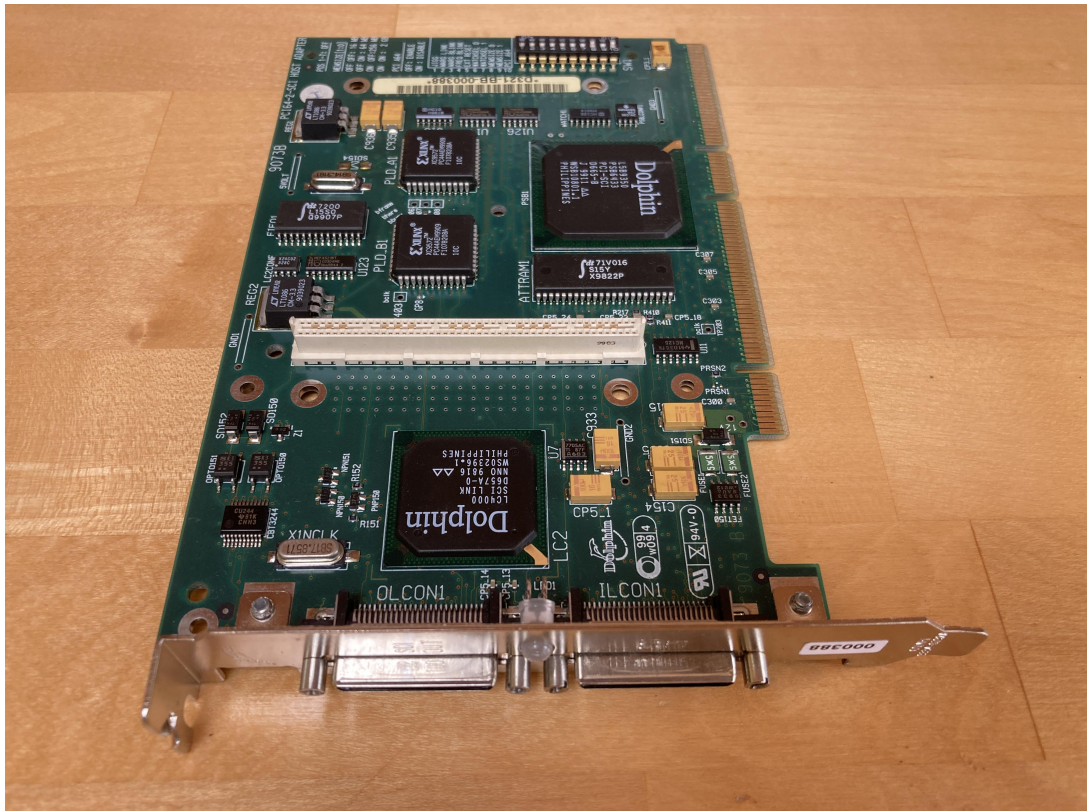


Figure 14: Dolphin D321 PCI64-2 ANSI/IEEE 1596-1992 Scalable Coherent Interface (SCI) Card, side view



Figure 15: The Dolphin D321 Cards preserved in this Collection