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06 infra TI

# Introdução ao DAS e SCSI



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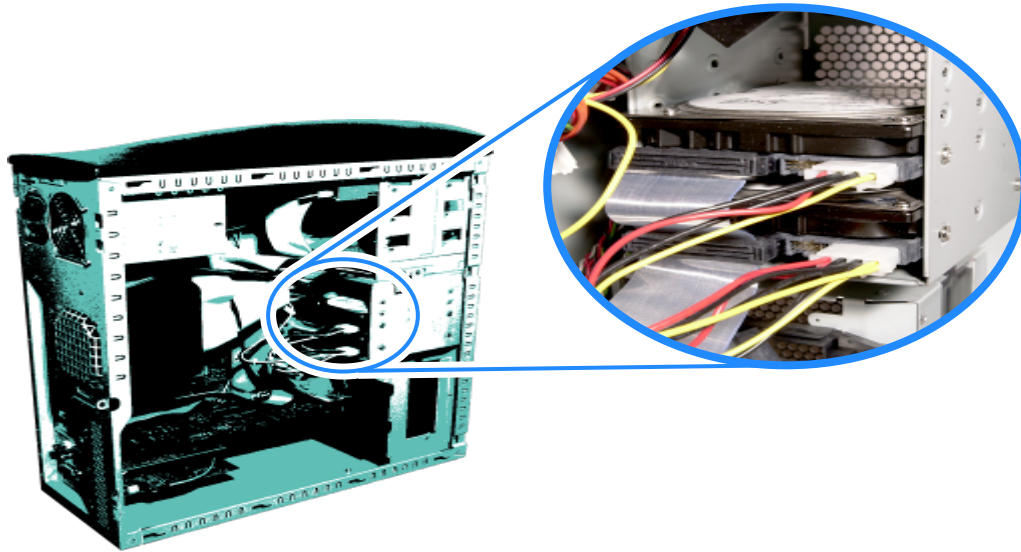
**DAS; Elements, Benefits and Challenges; Management options; Evolution of SCSI; SCSI – 3 architecture; SCSI addressing and communication model; DAS e SCSI comparison**

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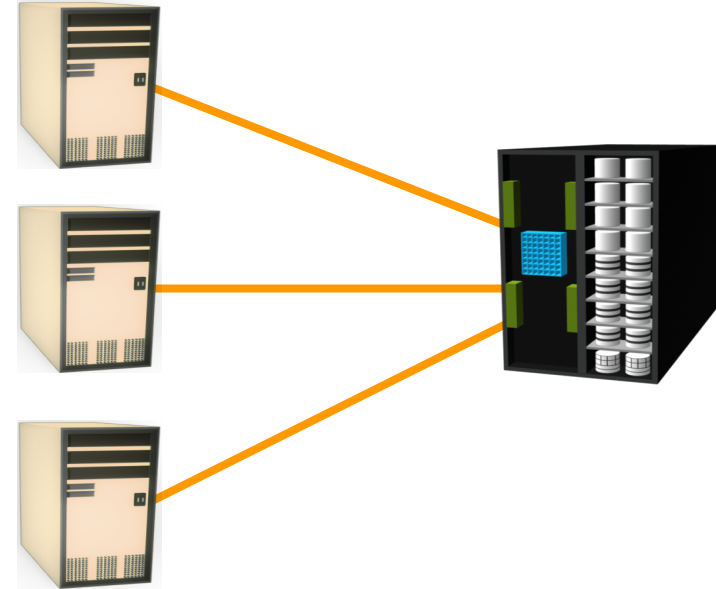
# What is DAS?

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Uses block level protocol for data access



**Internal Direct Connect**



**External Direct Connect**

# DAS Benefits

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- Ideal for local data provisioning
  - Quick deployment for small environments
  - Simple to deploy
  - Low capital expense
  - Low complexity
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# DAS Connectivity Options

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## **ATA (IDE) and SATA**

Primarily for internal bus

## **SCSI**

Parallel (primarily for internal bus)

Serial (external bus)

## **FC**

High speed network technology

## **Buss and Tag**

Primarily for external mainframe

Precursor to ESCON and FICON

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# DAS Management

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## Internal

Host provides:

- Disk partitioning (Volume management)

- File system layout

Direct Attached Storage managed individually through the server and the OS

## External

Array based management

Lower TCO (Total Cost of Ownership) for managing data and storage Infrastructure

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# DAS Challenges

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## **Scalability is limited**

- Number of connectivity ports to hosts
- Difficulty to add more capacity
- Limited bandwidth
- Distance limitations

## **Downtime required for maintenance with internal DAS**

## **Limited ability to share resources**

- Array front-end port
  - Unused resources cannot be easily re-allocated
  - Resulting in islands of over and under utilized storage pools
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# Evolution of Parallel SCSI

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## ANSI acknowledged SCSI as an industry standard

Developed by Shugart Associates & named as SASI (Shugart Associates System Interface)

### SCSI versions

#### SCSI-1

- Defined cable length, signaling characteristics, commands & transfer modes

- Used 8-bit narrow bus with maximum data transfer rate of 5 MB/s

#### SCSI-2

- Defined Common Command Set (CCS) to address non-standard implementation of the original SCSI

- Improved performance, reliability, and added additional features

#### SCSI-3

- Latest version of SCSI

- Comprised different but related standards, rather than one large document

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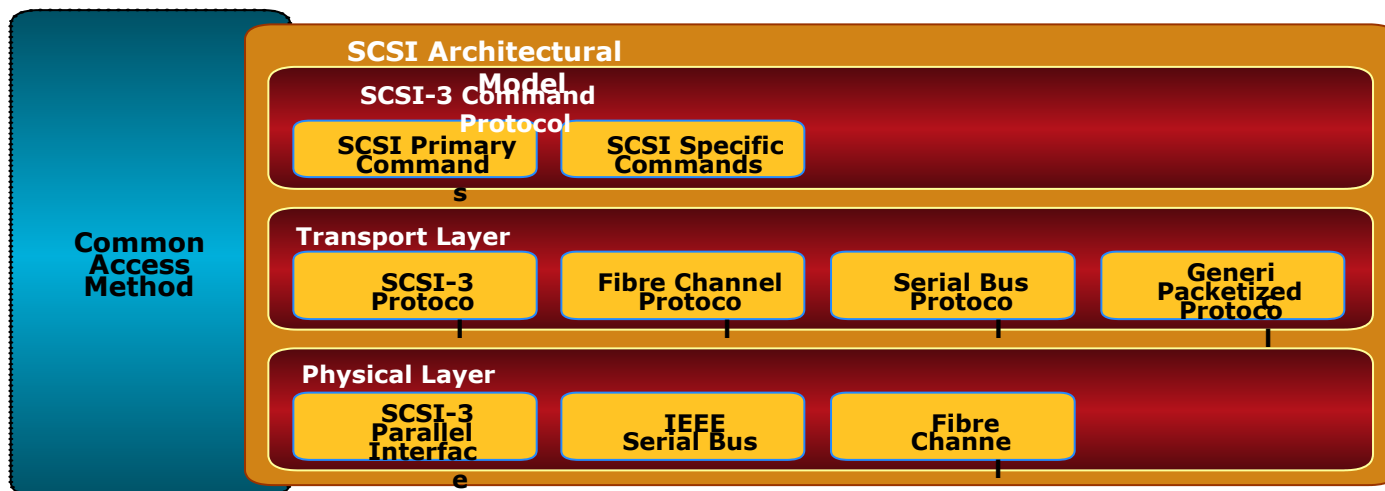
# SCSI-3 Architecture

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**SCSI command protocol** → Primary commands common to all devices

**Transport layer protocol** → Standard rules for device communication and information sharing

**Physical layer interconnect** → Interface details such as electrical signaling methods and data transfer modes





# SCSI Device Model

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SCSI communication involves:

SCSI initiator device

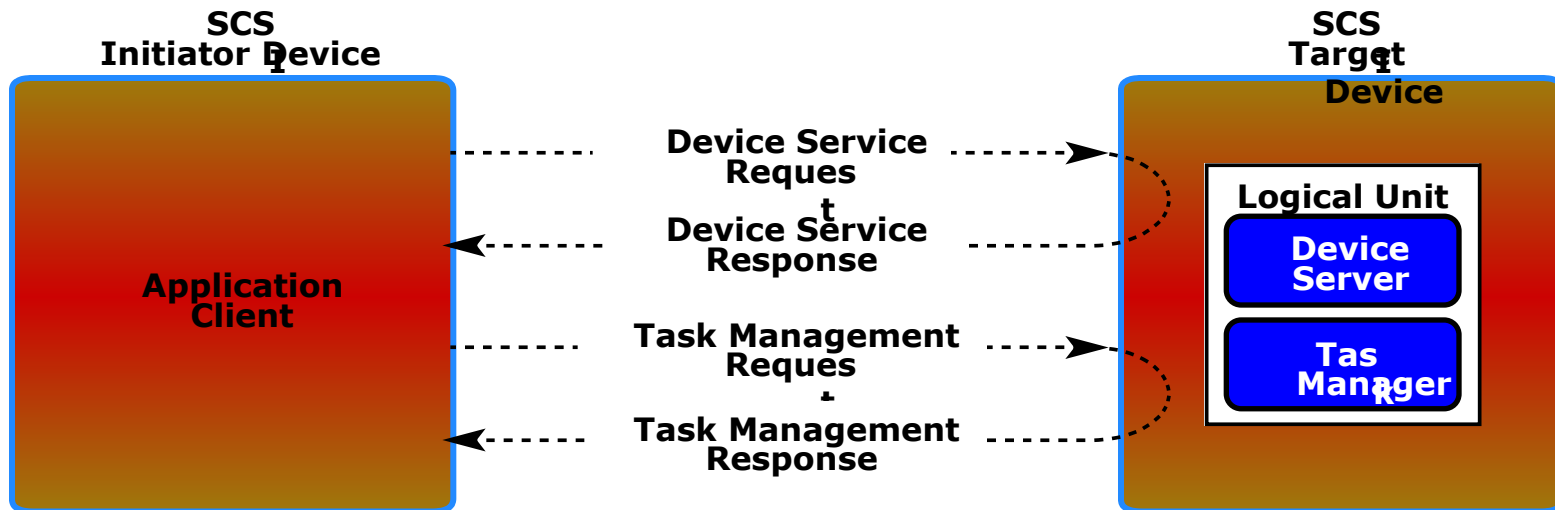
Issues commands to SCSI target devices

Example: SCSI host adaptor

SCSI target device

Executes commands issued by initiators

Examples: SCSI peripheral devices



# SCSI Device Model (Cont.)

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Device requests uses Command Descriptor Block (CDB)

- 8 bit structure

- Contain operation code, command specific parameter and control parameter

## SCSI Ports

- SCSI device may contain initiator port, target port, target/initiator port

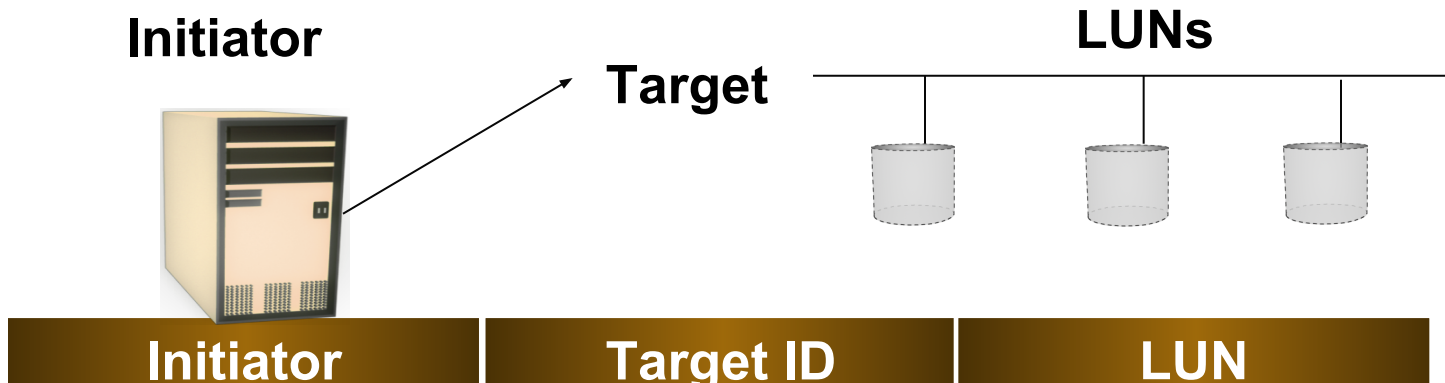
- Based on the port combination, a SCSI device can be classified as an initiator model, a target model, a target model with multiple ports or a combined model (target/initiator model). Example: Target/initiator device contain target/initiator port and can switch orientations depending on the role it plays while participating in an I/O operation

- To cater to service requests from multiple devices, a SCSI device may also have multiple ports (e.g. target model with multiple ports)

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# SCSI Addressing

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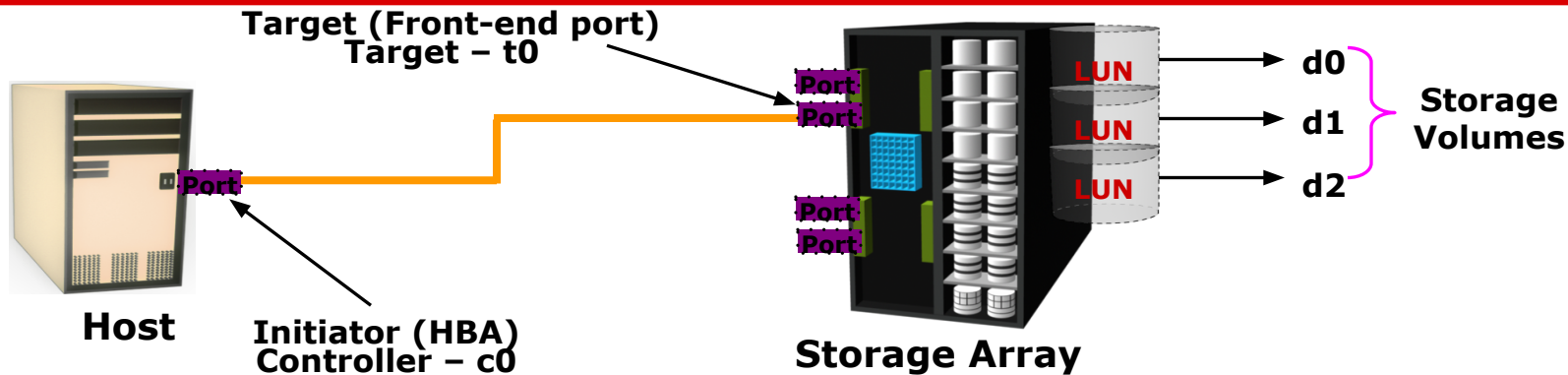
Initiator ID - a number from 0 to 15 with the most common value being 7.

Target ID - a number from 0 to 15

LUN - a number that specifies a device addressable through a target.

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# SCSI Addressing Example

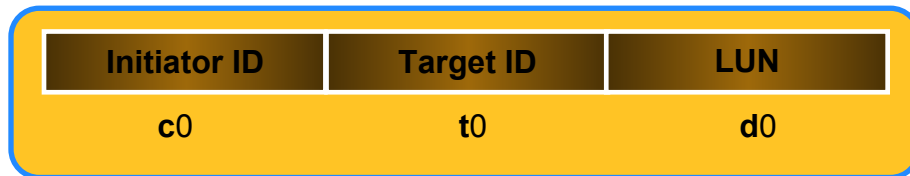


## Host Addressing:

Storage Volume 1 - c0t0d0

Storage Volume 2 - c0t0d1

Storage Volume 3 - c0t0d2



# Discussão e exercícios

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Em que cenários devemos empregar soluções de DAS ?

Quais as vantagens oferecidas pelas conexões de armazenamento SCSI e em que cenários melhor de aplicam?

Conexões paralelas são sempre mais rápidas que conexões seriais?

Há um algum paralelo dos protocolos SCSI com os protocolos de rede de comunicações de dados (TCP/IP)?

Qual o papel de um iniciator device?

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# Leitura recomendada

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## Capítulo 5

**Information Storage and Management Storing, Managing, and Protecting Digital Information in Classic, Virtualized, and Cloud Environments**

2nd Edition Edited by Somasundaram Gnanasundaram, Alok Shrivastava

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