THIẾT BỊ LƯU TRỮ

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Storage

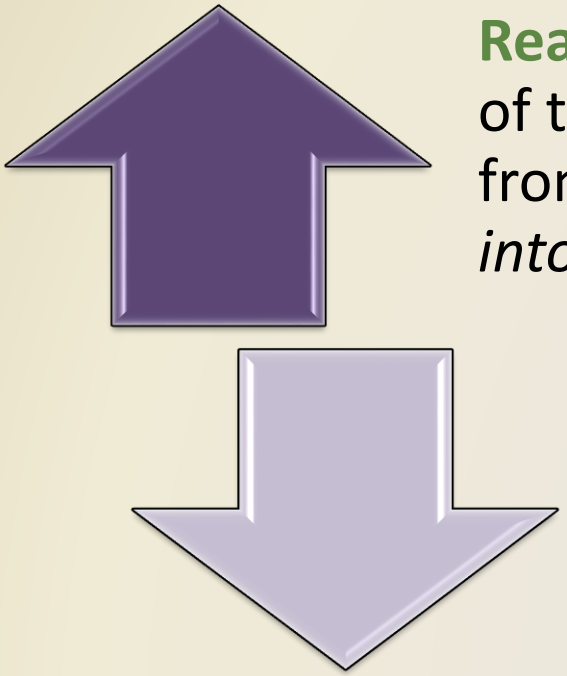
Lưu trữ

Storage holds data, instructions, and information *for future use*

Pages 352 – 353
Figure 7-1

Storage

- A **storage device** is the computer *hardware* that *records and/or retrieves* data, instruction and information.



Reading is the process of transferring items from a *storage medium into memory*

Writing is the process of transferring items from *memory to a storage medium*

Storage

- **Capacity** is the number of bytes a storage medium can hold

Storage Terms

Storage Term	Approximate Number of Bytes	Exact Number of Bytes
Kilobyte (KB)	1 thousand	2^{10} or 1,024
Megabyte (MB)	1 million	2^{20} or 1,048,576
Gigabyte (GB)	1 billion	2^{30} or 1,073,741,824
Terabyte (TB)	1 trillion	2^{40} or 1,099,511,627,776
Petabyte (PB)	1 quadrillion	2^{50} or 1,125,899,906,842,624
Exabyte (EB)	1 quintillion	2^{60} or 1,152,921,504,606,846,976
Zettabyte (ZB)	1 sextillion	2^{70} or 1,180,591,620,717,411,303,424
Yottabyte (YB)	1 septillion	2^{80} or 1,208,925,819,614,629,174,706,176

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Figure 7-2

Hard Disks

- A **hard disk** is a storage device that contains one or more *circular platters that use magnetic particles to store* data, instructions, and information

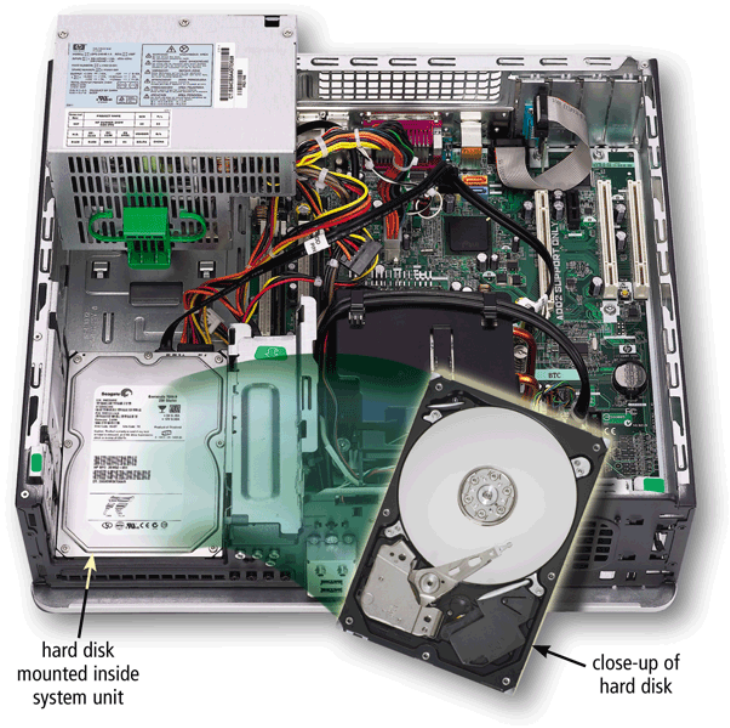

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Figure 7-5

Hard Disks

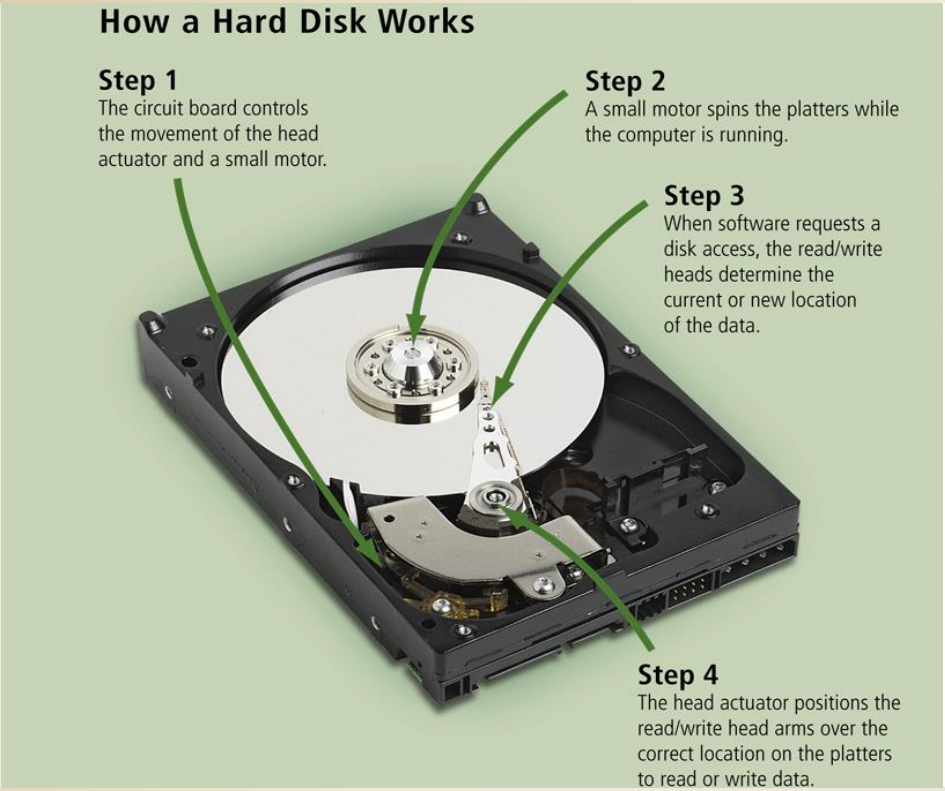

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Figure 7-9

Hard Disks

- Data are stored in rings called **tracks**.
- Sections within each track called **sectors** (~512 bytes).
- A **cylinder** consists of the set of tracks that are at the same head position on the disk.

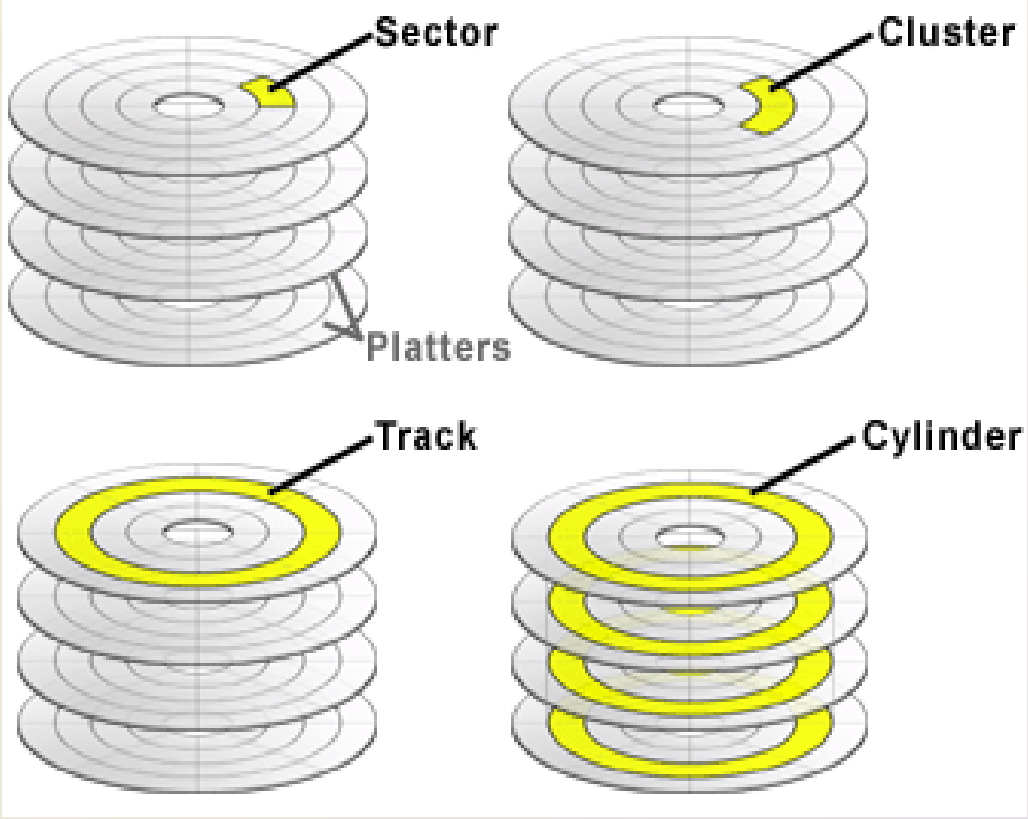

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Figure 7-10

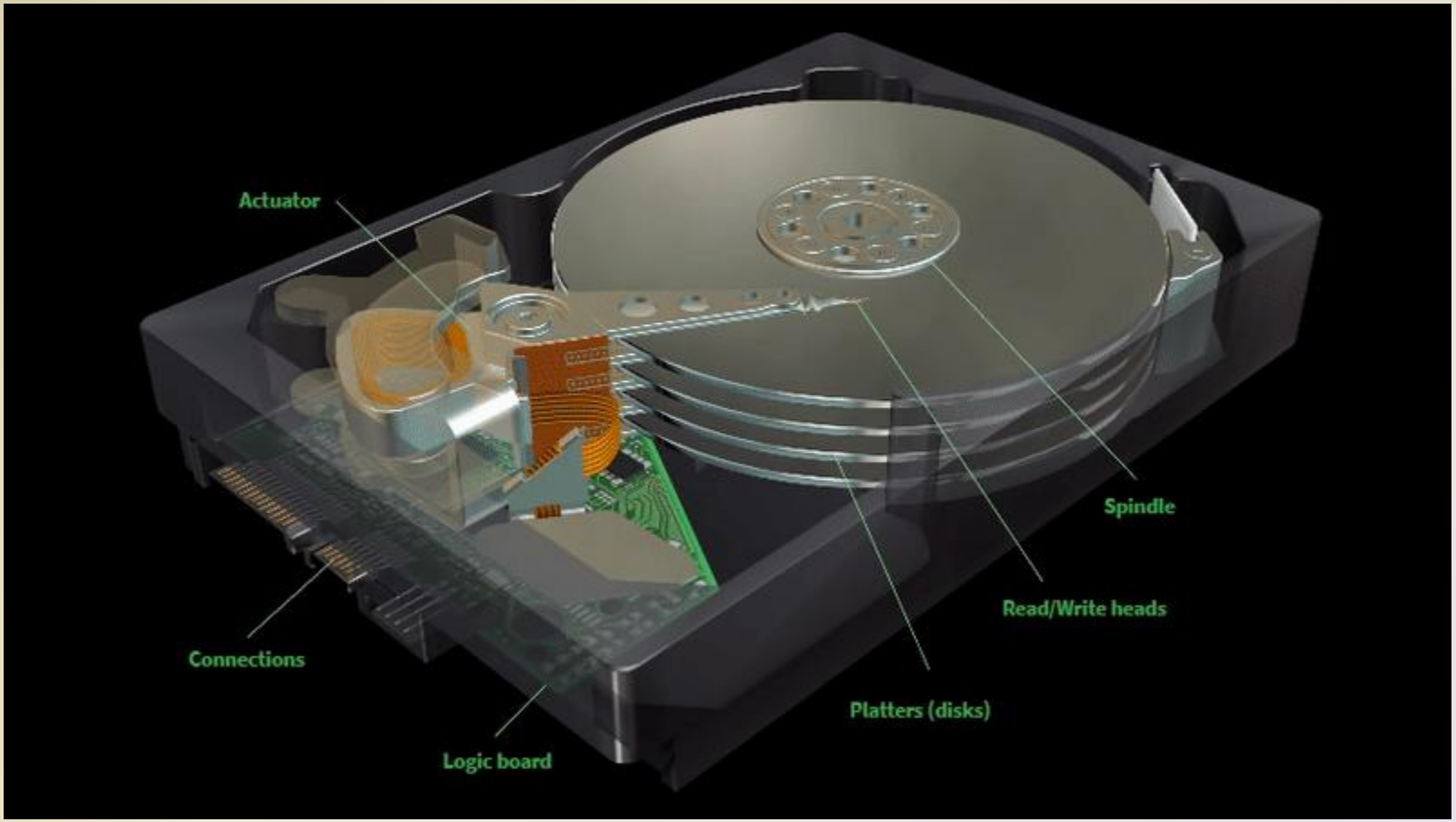
Hard Disks


Vỏ của đĩa cứng
Đĩa từ
Thanh mang đầu từ
Mô tơ điều khiển thanh mang đầu từ
Mô tơ điều khiển trục quay
Đầu từ

Hard Disks


Trục quay
Đầu đọc
Tay truyền động
Trục truyền động
Bộ điều khiển truyền động
Vít định vị
Đĩa cứng
Cáp nối đầu đọc
Cổng giao tiếp SCSI
Chân cài Jum
Jum
Điện áp vào
Dấu niêm phong băng từ

Hard Disks


Actuator
Spindle
Read/Write heads
Connections
Platters (disks)
Logic board

Hard Disks

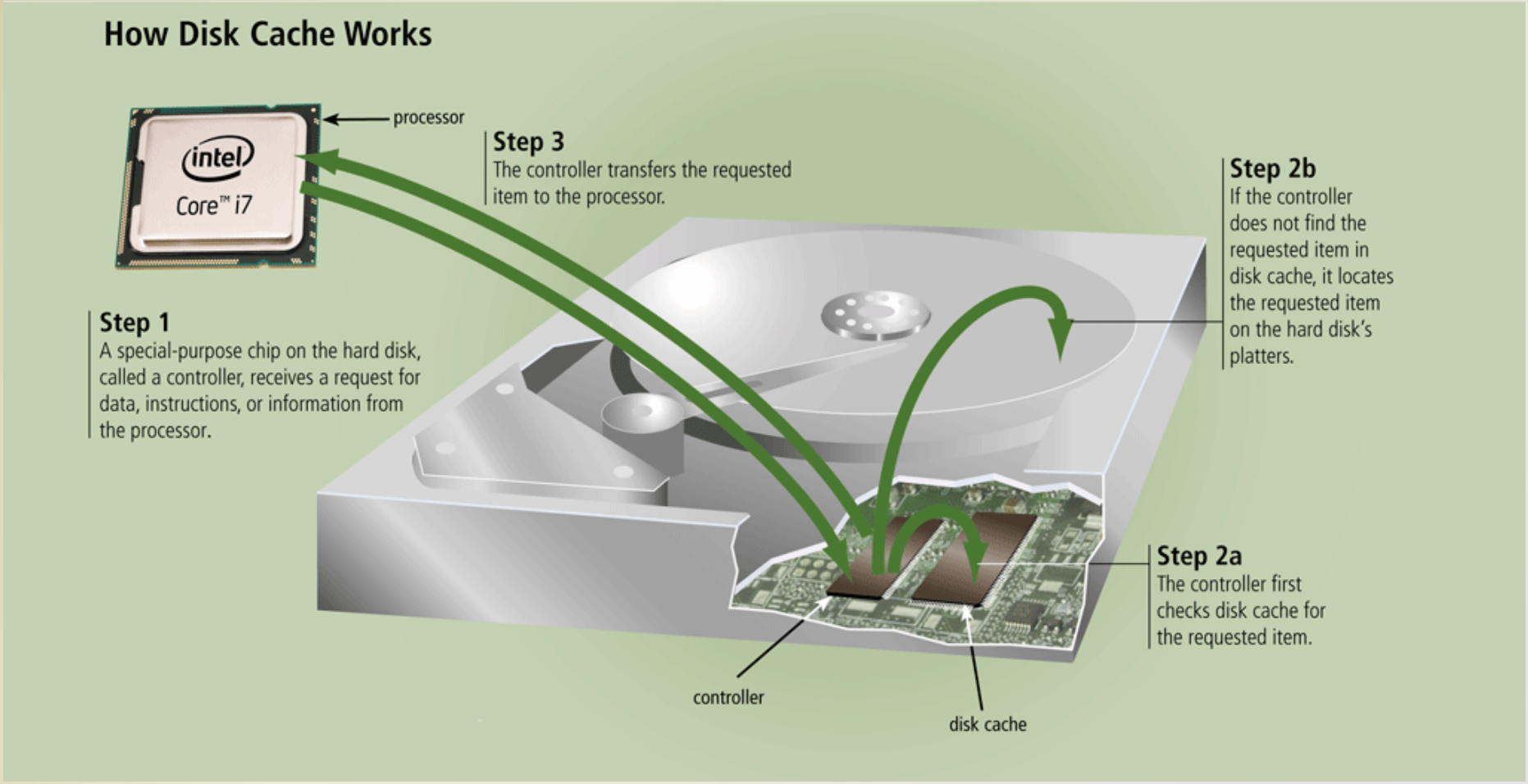


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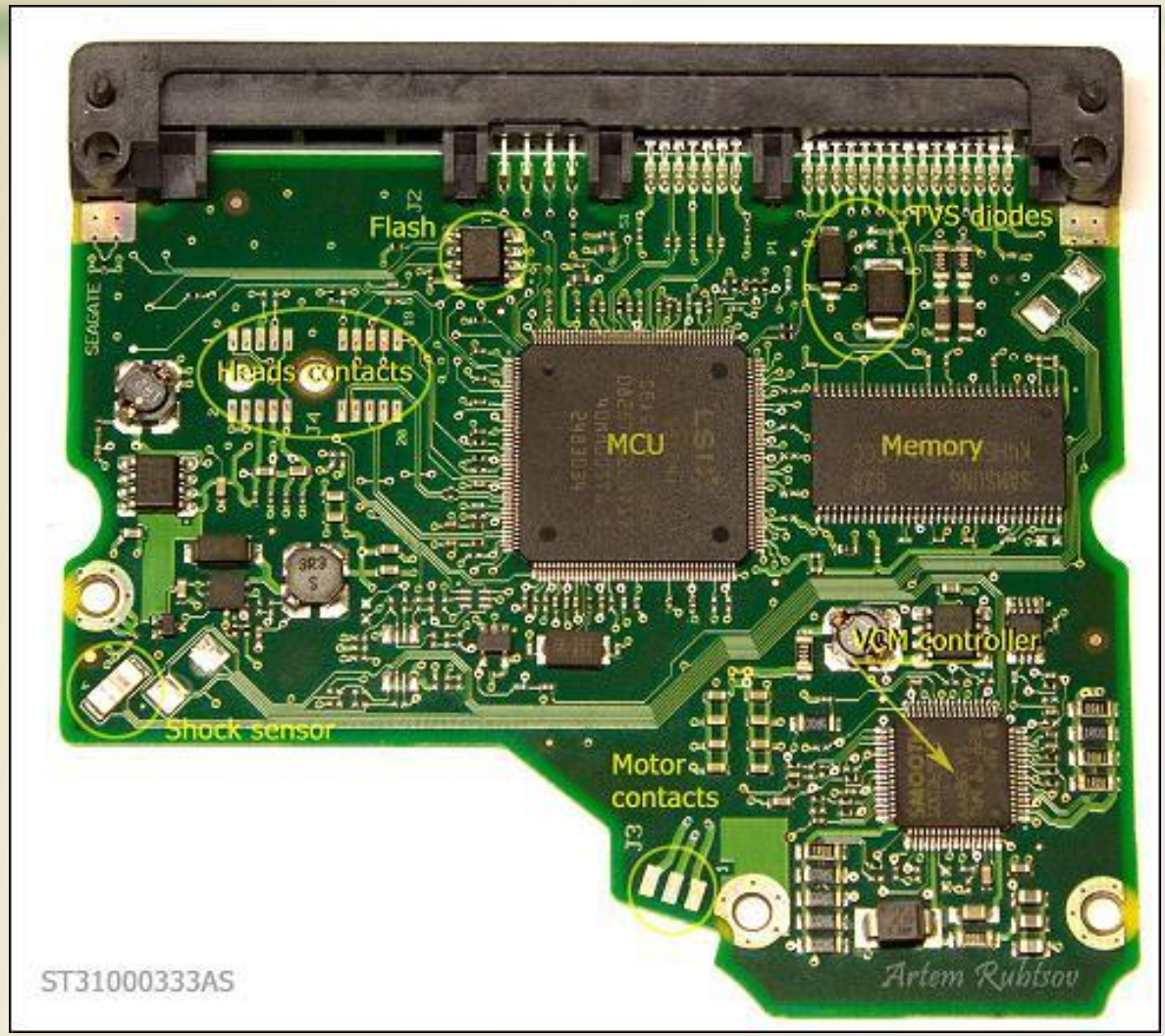
Figure 7-12

Hard Disks


Flash
TVS diodes
Heads contacts
MCU
Memory
VCM controller
Shock sensor
Motor
contacts
ST31000333AS
Artem Rubtsov

Hard Disks

- **RAID** (redundant array of independent disks) is a group of two or more *integrated hard disks*
- A **network attached storage (NAS)** device is a server connected to a network with the sole purpose of providing storage

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Figure 7-13

Hard Disks

Hard Disks

Hard Disks

Hard Disks

An ***external hard disk*** is a separate free-standing hard disk that connects to your computer with a *cable or wirelessly*

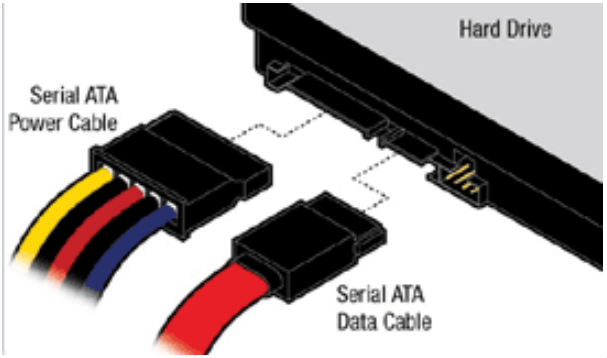
A ***removable hard disk*** is a hard disk that you *insert* and remove from a drive

Hard Disks

Hard Disks

- Sorts of interface that a hard disk is connected to computer:

SATA

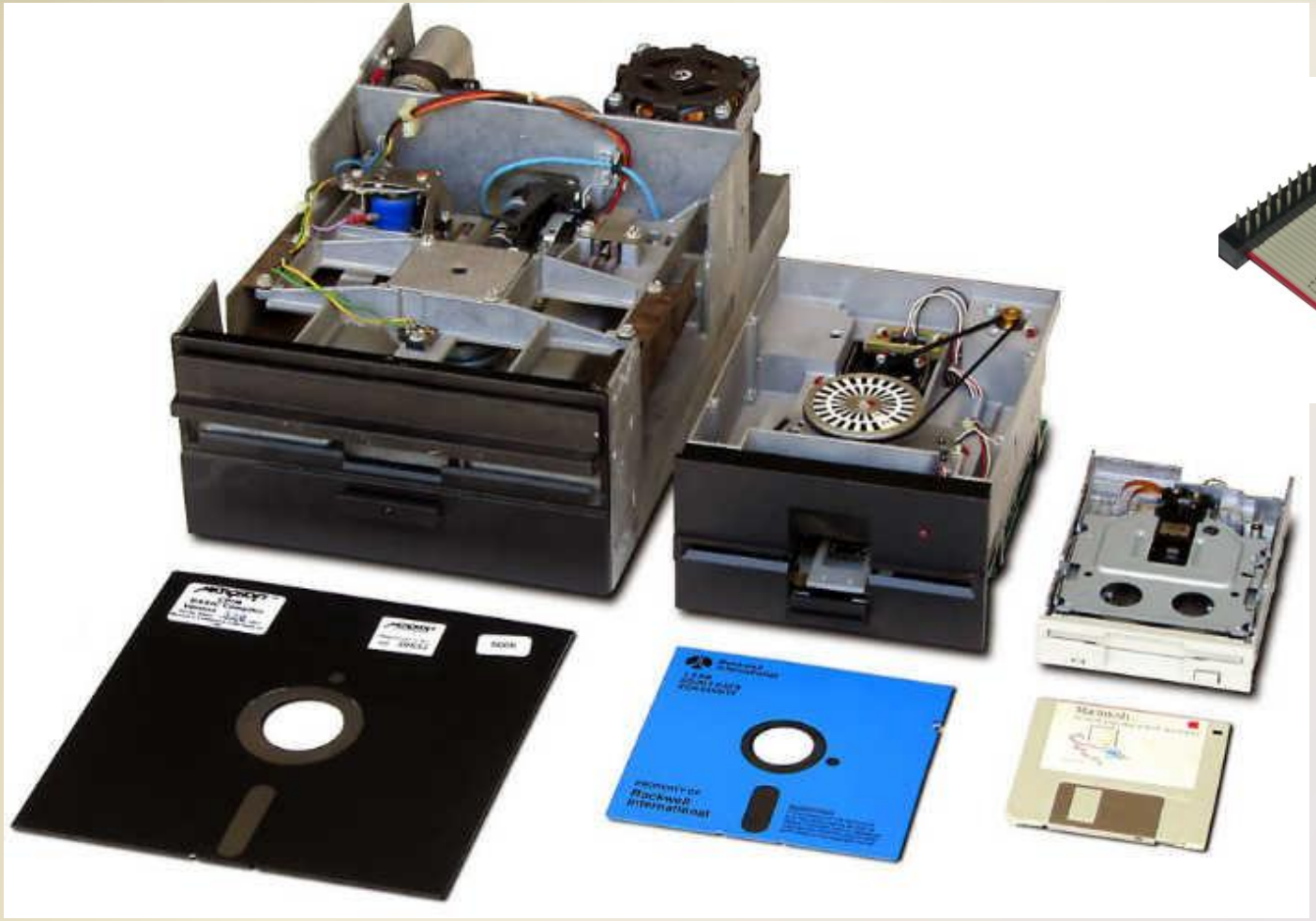


EIDE

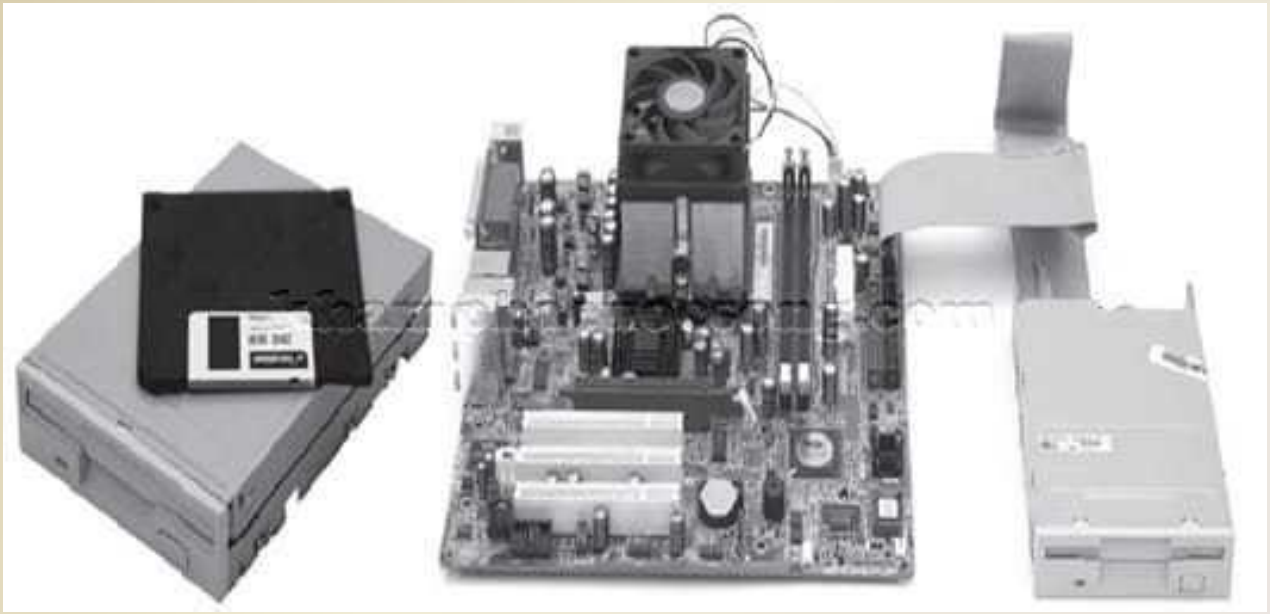
SCSI

SAS

Hard Disks

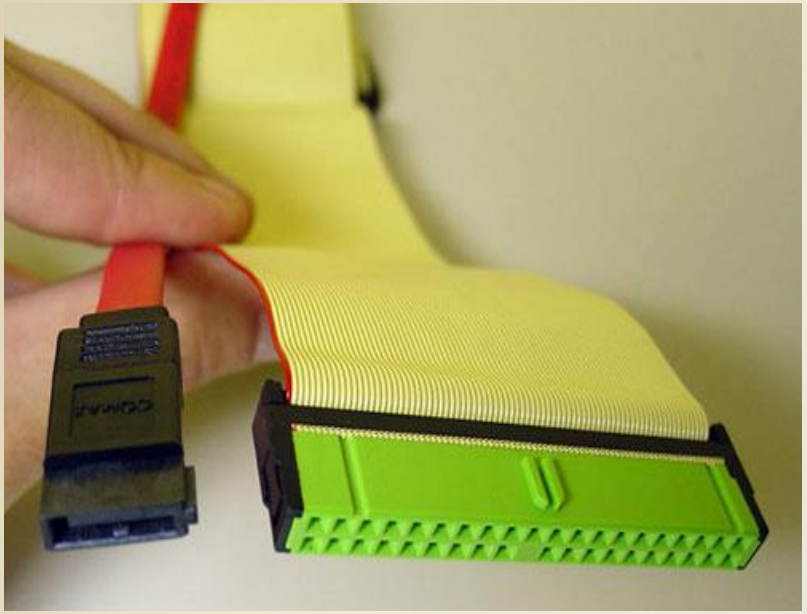


Hard Disks

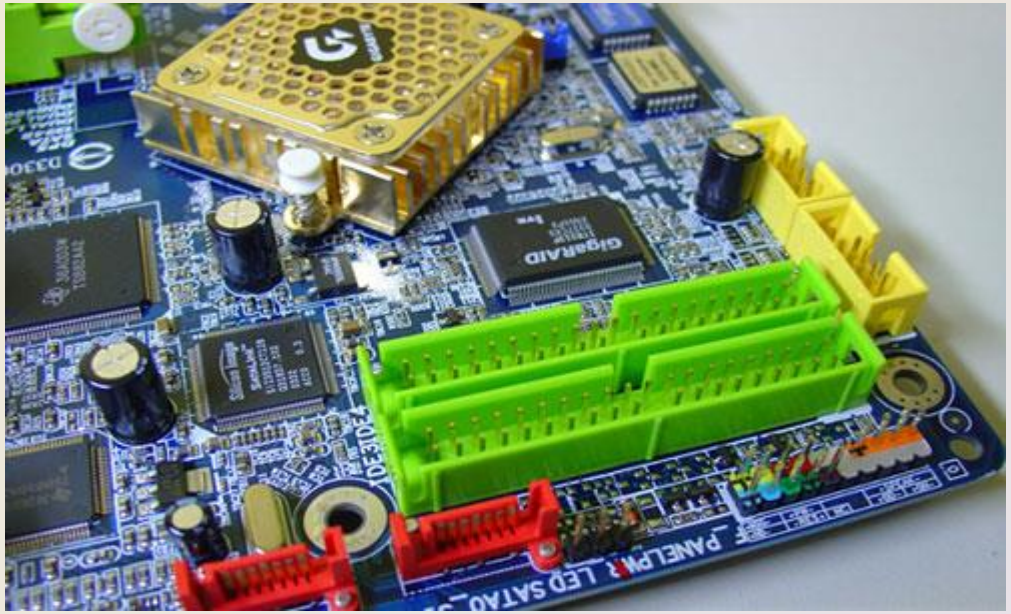


Hard Disks

- Sorts of interface that a hard disk is connected to computer:

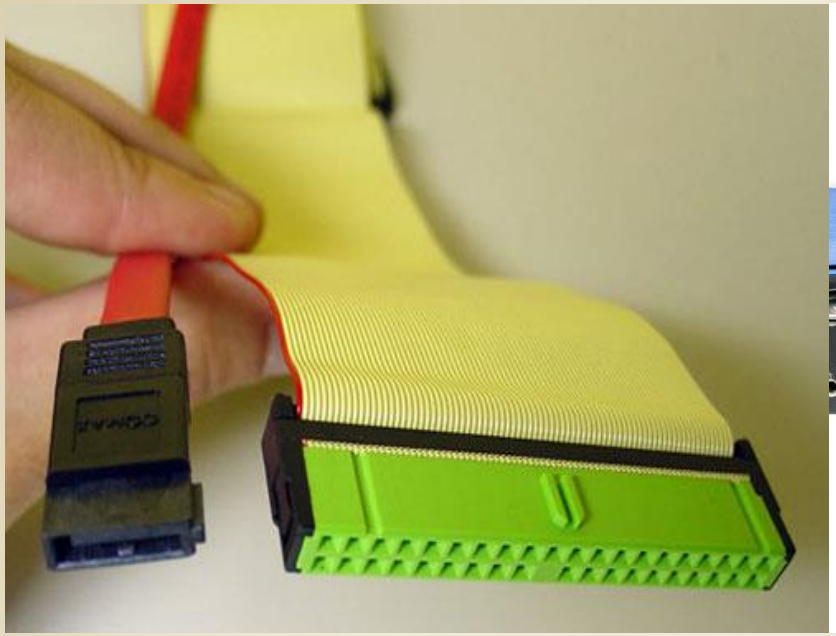


SATA vs. IDE cables

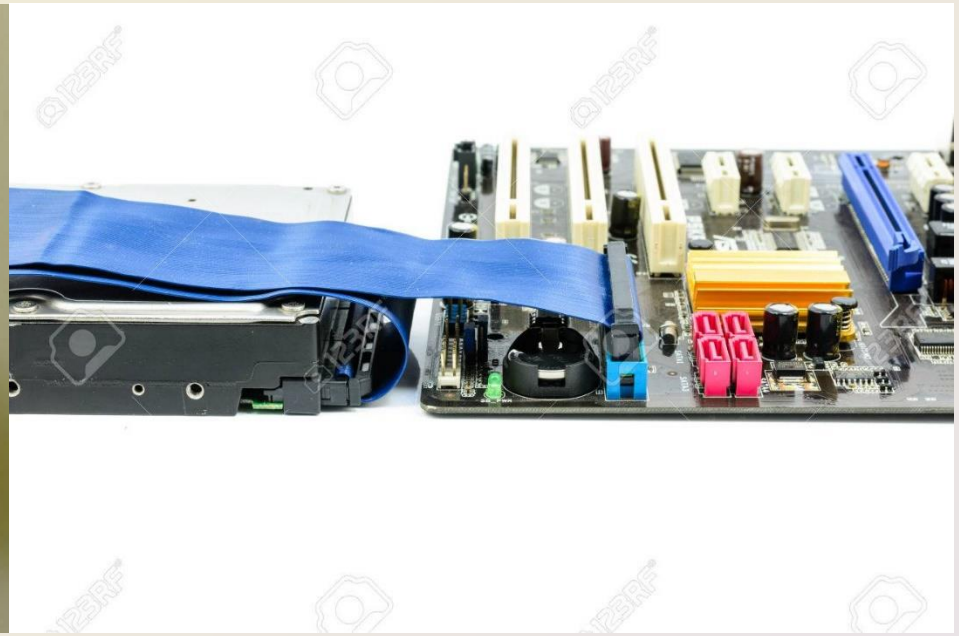


SATA ports (red) vs. IDE ports (green)

Hard Disks



SATA vs. IDE cables



SATA ports (red) vs. IDE ports (green)

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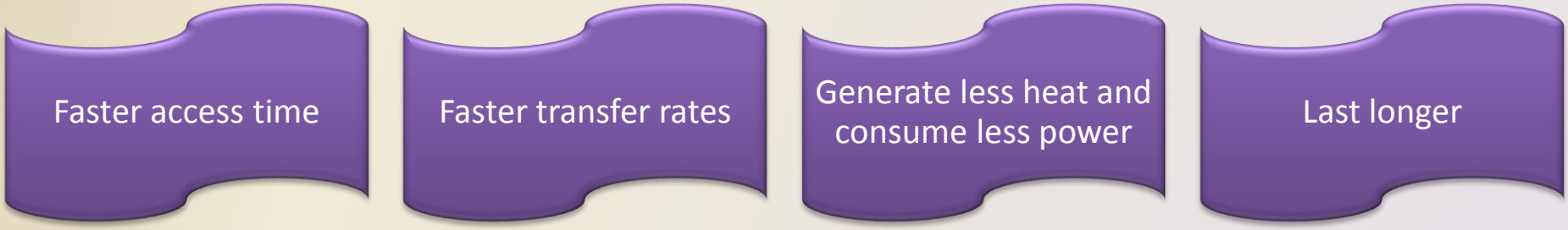
Flash Memory Storage

- **Flash memory chips** are a type of *solid state* media and contain *no moving parts*
- **Solid state drives** (**SSDs**) have several advantages over magnetic hard disks:



Flash Memory Storage

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Figure 7-17

Flash Memory Storage

Flash Memory Storage

Media Type		Storage Capacity	Use
CompactFlash (CF)		512 MB to 100 GB	Digital cameras, smart phones, PDAs, photo printers, portable media players, notebook computers, desktop computers
Secure Digital (SD)		512 MB to 8 GB	Digital cameras, digital video cameras, smart phones, PDAs, photo printers, portable media players
SDHC		4 to 32 GB	Digital cameras
microSD		1 to 2 GB	Smart phones, portable media players, handheld game consoles, handheld navigation devices
microSDHC		4 to 16 GB	Smart phones, portable media players, handheld game consoles, handheld navigation devices

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Figures 7-18 – 7-19

Flash Memory Storage

Flash Memory Storage

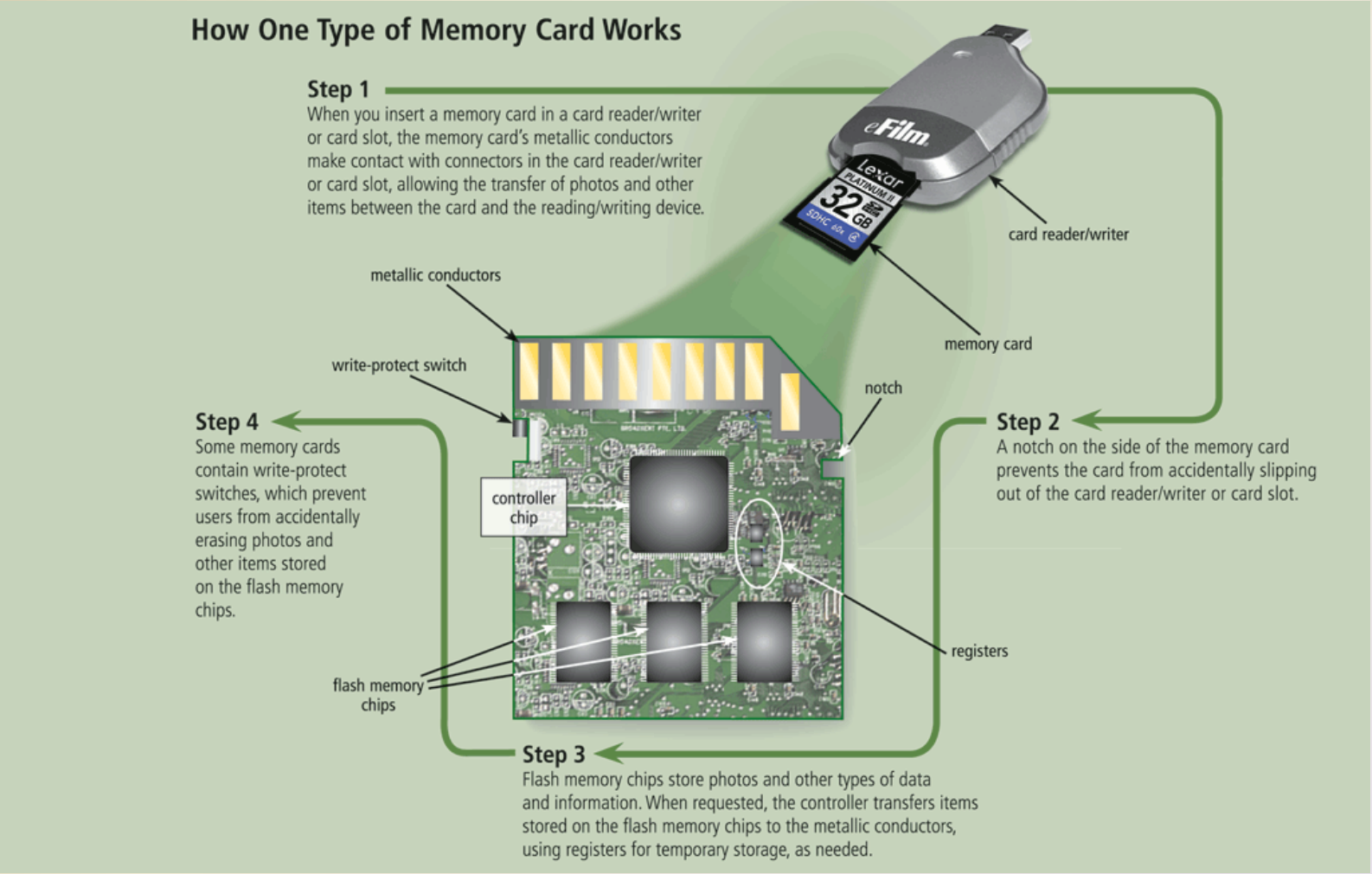

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Figure 7-20

Flash Memory Storage

- **USB flash drives** plug into a USB port on a computer or mobile device

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Figure 7-21

Cloud Storage

- **Cloud storage** is an Internet service that provides storage to computer users

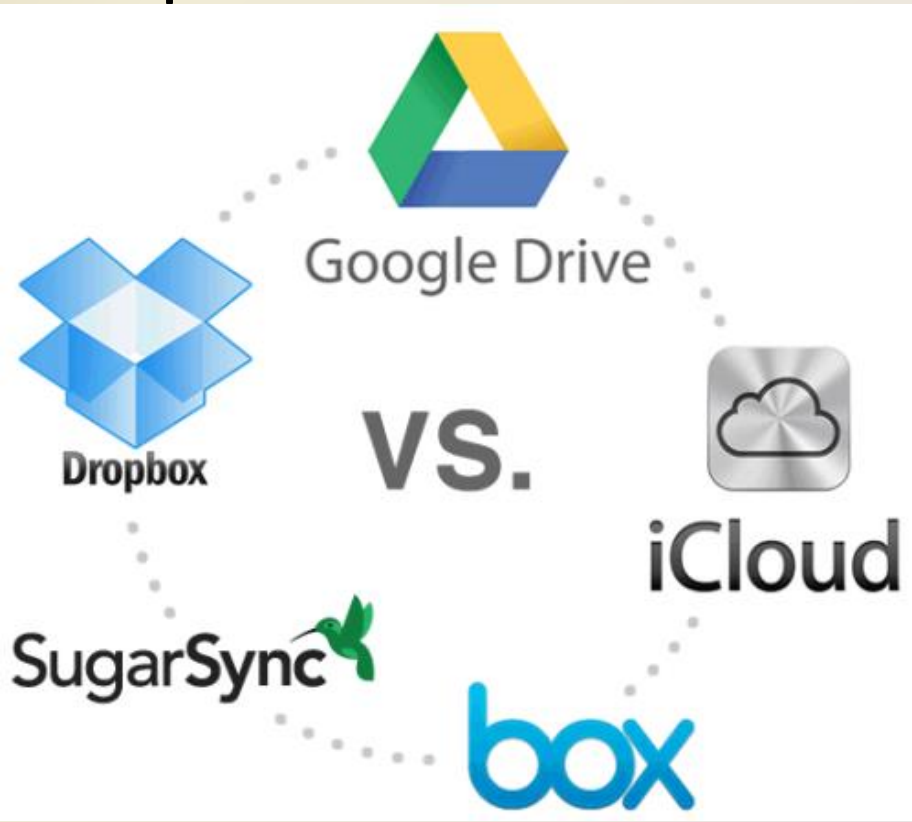

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Figure 7-23

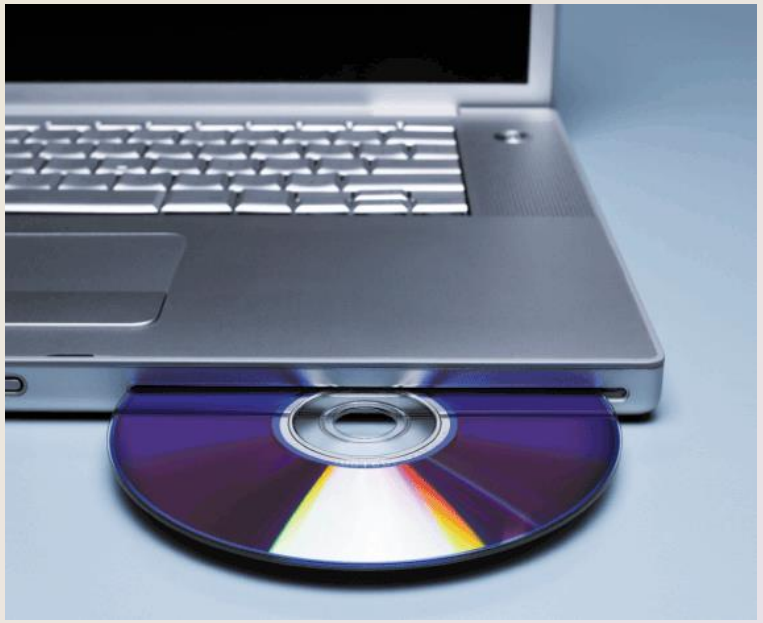
Cloud Storage

Cloud Storage Providers

Web Site Names	Type of Storage Provided	Other Services
Box.net, IDrive, Windows Live SkyDrive	Backup or additional storage for any type of file	
Flickr, Picasa	Digital photos	Photo editing and photo management
YouTube	Digital videos	
Facebook, MySpace	Digital photos, digital videos, messages, and personal information	Social networking
Google Docs, Office Web Apps	Documents, spreadsheets, presentations	Productivity suite
Gmail, Windows Live Hotmail, Yahoo! Mail	E-mail messages	
Amazon EC2, Amazon S3, Nirvanix	Enterprise-level storage	Web services, data center services

Optical Discs

- An **optical disc** consists of a flat, round, portable disc made of metal, plastic, and lacquer that is *written and read by a laser*
- Read only vs. rewritable



Optical Discs

- Care of optical discs

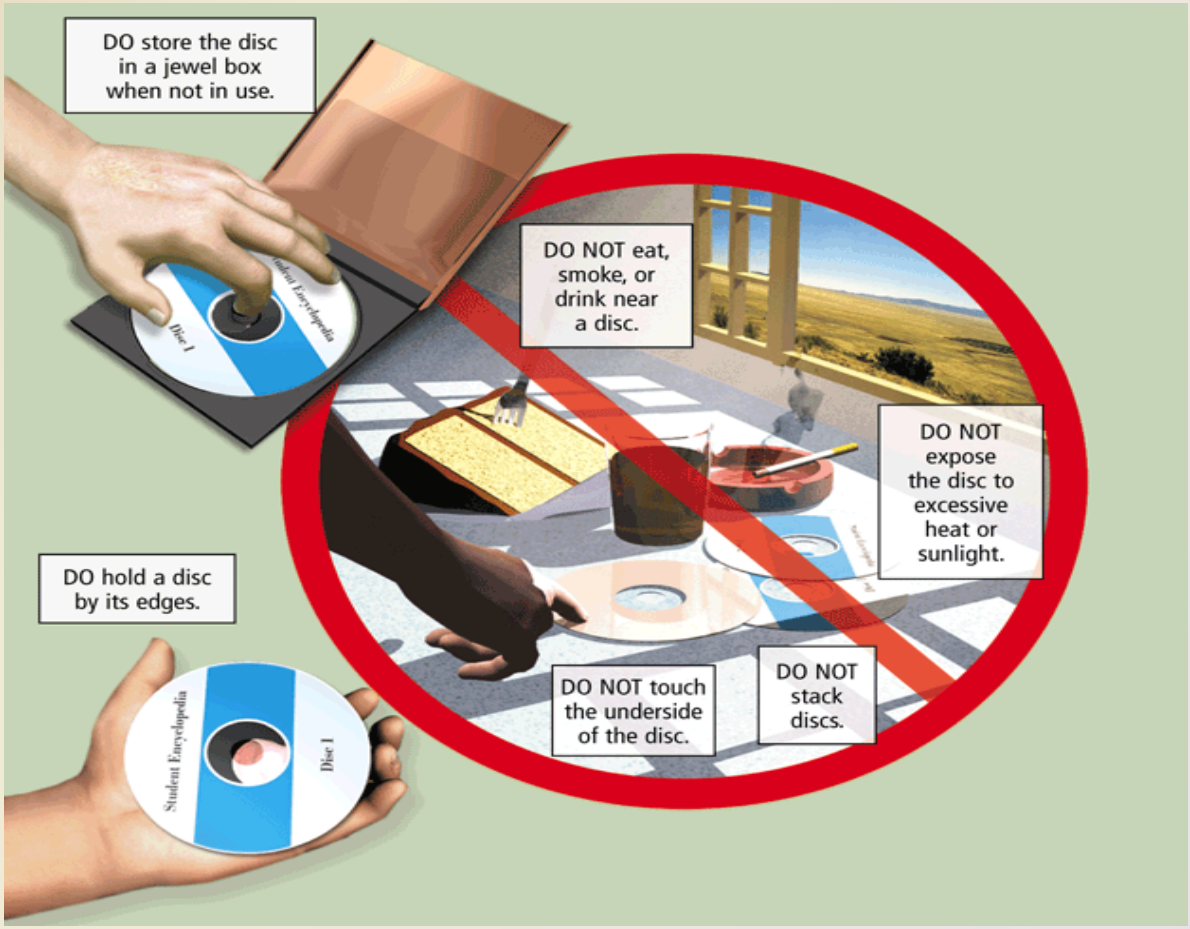


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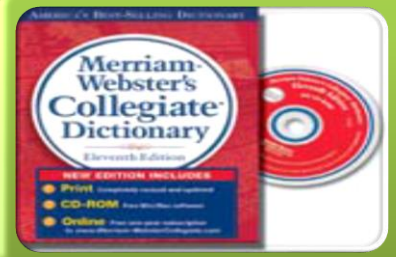
Figure 7-28

Optical Discs



A **CD-ROM** can be read from but not written to

- Read from a **CD-ROM drive** or CD-ROM player

A **CD-R** is a multisession optical disc on which users can write, but not erase

A **CD-RW** is an erasable multisession disc

- Must have a **CD-RW drive**

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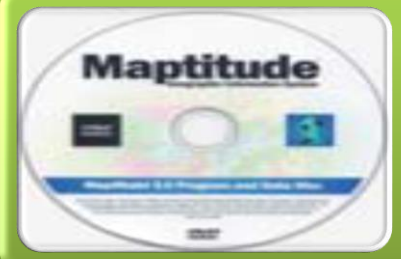
Figure 7-29

Optical Discs



A **DVD-ROM** is a high-capacity optical disc on which users can read but not write or erase

- Requires a **DVD-ROM drive**

A Blu-ray Disc-ROM (BD-ROM) has a storage capacity of 100 GB

DVD-RW, **DVD+RW**, and **DVD+RAM** are high-capacity rewritable DVD formats

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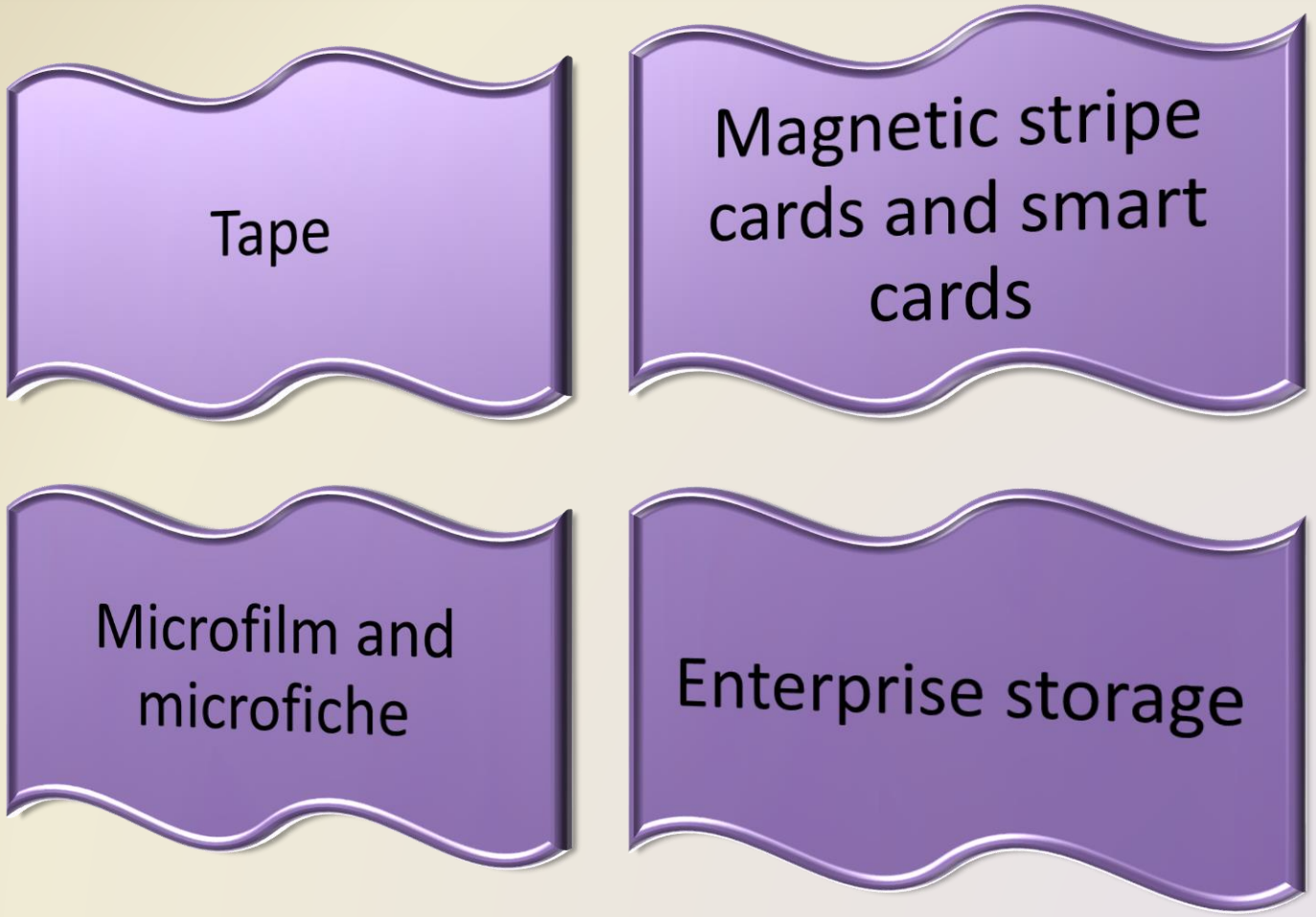
Figure 7-29

Other Types of Storage



Other Types of Storage

- **Tape** is a magnetically coated ribbon of plastic capable of storing large amounts of data and information
- A **tape drive** reads and writes data and information on a tape

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Figure 7-35

Other Types of Storage

Page 376
Figure 7-35

Other Types of Storage

- A **magnetic stripe card** contains a magnetic stripe that stores information.

- A **smart card** stores data on a thin microprocessor embedded in the card.

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Figure 7-36

Other Types of Storage

Other Types of Storage

- **Microfilm** and **microfiche** store microscopic images of documents on a roll or sheet film

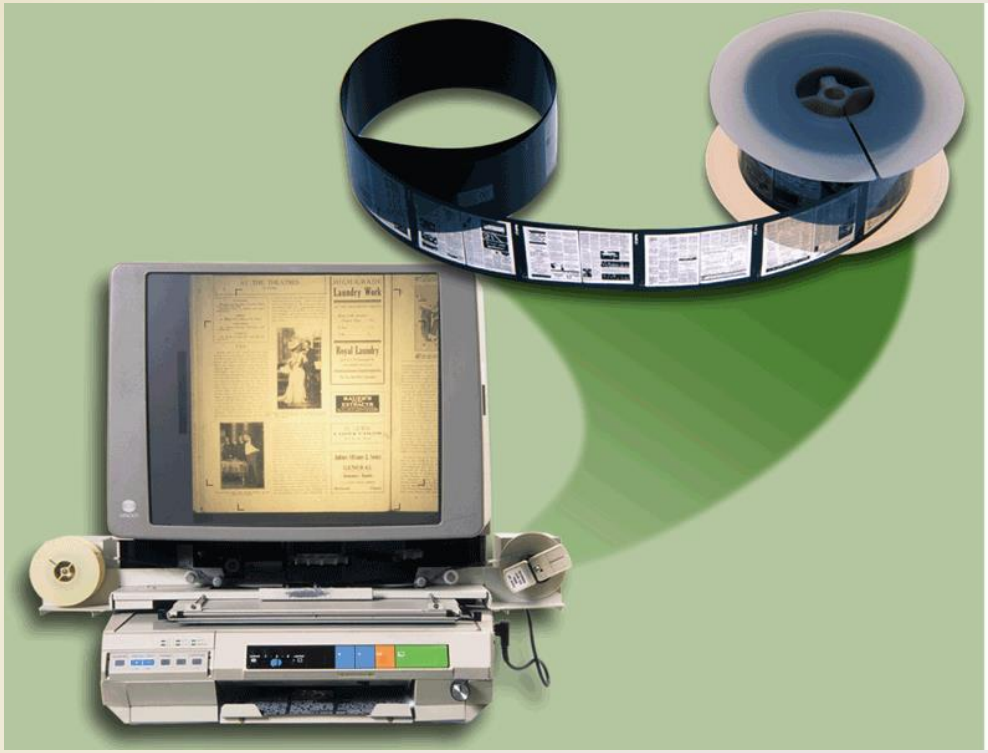

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Figure 7-37

Other Types of Storage

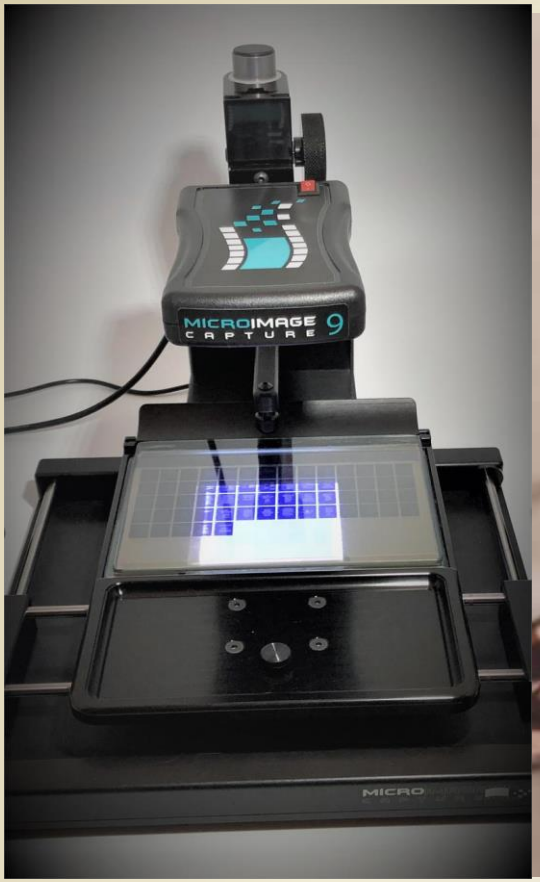

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Figure 7-37

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