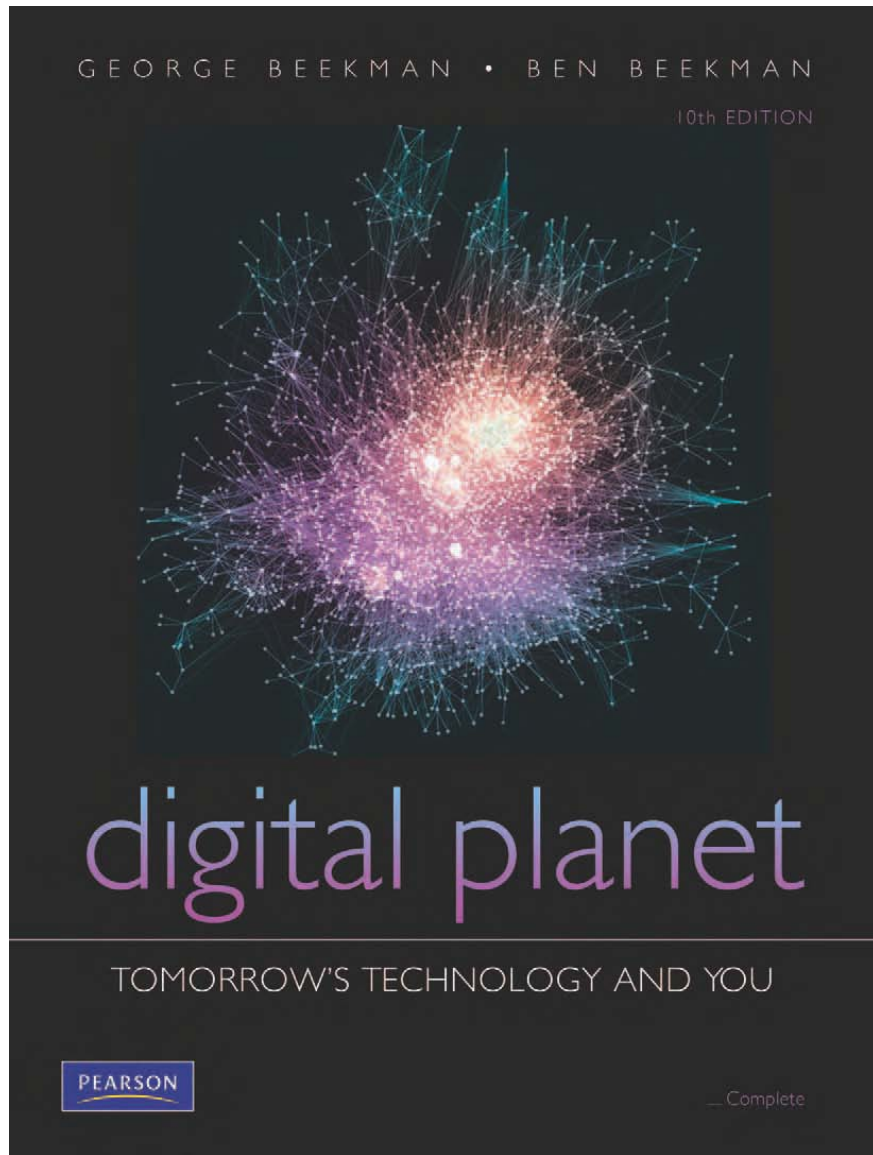




Digital Planet: Tomorrow's Technology and You

George Beekman • Ben Beekman

Tenth Edition

Digital Planet: Tomorrow's Technology and You

Chapter 6 Graphics, Digital Media, and Multimedia

Chapter 6 Objectives

- ✓ Explain the difference between painting software, image-processing software, drawing software, and 3-D modeling software
- ✓ Explain effective techniques for improving the quality of slides prepared with presentation-graphics software
- ✓ Describe how digital technology is used in video and audio production today

Chapter 6 Objectives (cont.)

- ✓ Describe how data compression works
- ✓ Describe several present and future applications for multimedia technology

Tim Berners-Lee Weaves the Web for Everybody

✓ Tim Berners-Lee

- Born in London in 1955
- Wanted to create an open-ended, distributed hypertext system with no boundaries, so scientists everywhere could link their work together
- Invented the World Wide Web
- Heads the World Wide Web Consortium (W3C)



Painting: Bitmapped Graphics

- ✓ ***Pixels***: tiny dots of white, black, or color that make up images on the screen
- ✓ ***Painting software***:
 - Paints pixels on the screen with a pointing device
 - Pointer movements are translated into lines and patterns on the screen
 - ***Palette*** of tools mimics real-world painting tools

Painting: Bitmapped Graphics

- ✓ *Bitmapped graphics* (or *raster graphics*): pictures show how the pixels are mapped on the screen
 - Gray-scale graphics: uses 8 bits per pixel; allows up to 256 shades of gray
 - Color depth: number of bits devoted to each pixel
 - Resolution: density of the pixels; described as DPI (dots per inch)
 - *Anti-aliasing*: smoothes out less-than-ideal resolutions

Image Processing: Photographic Editing by Computer

- ✓ *Image processing:* users manipulate photographs with tools such as Adobe Photoshop
- ✓ More powerful than traditional photo-retouching techniques
- ✓ Can distort and combine photos
- ✓ Can create fabricated images that show no evidence of tampering

Image Processing: Photographic Editing by Computer (cont.)

- ✓ Digital photo management software programs simplify and automate common tasks associated with capturing, organizing, editing, and sharing digital images.
 - Apple iPhoto
 - Google Picasa
 - Adobe Lightroom

Drawing: Object-Oriented Graphics

- ✓ *Drawing software* stores a picture as a collection of lines and shapes (called *object-oriented* or *vector graphics*).
- ✓ Many drawing tools—line, shape, and text tools—are similar to painting tools in bitmapped programs.

Drawing: Object-Oriented Graphics (cont.)

- ✓ **PDF (*portable document format*)**: file format developed by Adobe; enables digital documents to be exchanged between programs independent of application software, hardware, or operating system
 - Can contain text, fonts, images, and vector graphics
 - Can be displayed by Web browsers using Adobe's Acrobat Reader

Drawing: Object-Oriented Graphics (cont.)

- ✓ Bitmapped painting (pixels) gives you these advantages:
 - More control over textures, shading, and fine detail
 - Appropriate for screen displays, simulating natural paint media, and embellishing photographs
 - Object-oriented drawing gives you advantages, such as cleaner lines and smoother shapes

Drawing: Object-Oriented Graphics (cont.)

- ✓ Some integrated programs contain both drawing and painting modules.
 - Allows you to choose the right tool for each job
- ✓ Some programs merge features of both in a single application.
 - Blurs the distinction between types
 - New possibilities for amateur and professional illustrators

Creating Smart Art

- Choose the right tool for the job
- Always keep a native copy
- Know your graphics file formats
- Borrow from the best
- Don't borrow without permission
- Understand your rights: www.copyright.gov
- Consider letting others build on your work: www.creativecommons.org

3-D Modeling Software

- ✓ ***3-D modeling software:*** used to create three-dimensional objects with tools similar to those in drawing software
- ✓ Goal for some applications: to create an animated presentation rather than a printout
- ✓ Flexible: can create a 3-D model, rotate it, view it from different angles
- ✓ Can “walk-through” a 3-D environment that exists only in the computer’s memory

CAD/CAM: Turning Pictures into Products

- ✓ *(CAD) computer-aided design*: allows engineers, designers, and architects create designs on screen products ranging from computer chips to public buildings
- ✓ Can create 3D, solid models with physical characteristics like weight, volume, center of gravity
- ✓ Cheaper, faster, and more accurate than traditional design-by-hand techniques
- ✓ Can do stress tests to evaluate the structural performance of any part of the model

CAD/CAM: Turning Pictures into Products

- ✓ *CAM (computer-aided manufacturing)*: process by which data related to the product design are fed into a program that controls the manufacturing of parts
- ✓ *CIM (computer-integrated manufacturing)*: combination of CAD/CAM



Making Powerful Presentations

- Make plan before create slides
- Determine slide count
- Outline ideas
- Keep each slide focused
- Use large letters
- Be smart with art
- Keep it simple
- Do test run before making presentation
- Don't read slides
- Pause when revealing new slide or bullet

Dynamic Media: Beyond the Printed Page

- Modern media contains dynamic information: information that changes over time or in response to user input
 - Animation
 - Video
 - Audio
 - Hypertext



Presentation Graphics: Bringing Lectures to Life

- ✓ ***Presentation graphics:*** automates creation of visual aids for lectures, training sessions, sales demonstrations, and other presentations
- ✓ Creates slideshows directly on computer monitors or LCD projectors, including still images, animation, and video clips

Animation: Graphics in Time

- ✓ Each frame a computer-drawn picture; frames are displayed in rapid succession
- ✓ ***Tweening***: instead of drawing each frame by hand, the animator can create key frames and objects and use software to help fill in the gaps
- ✓ Vector graphics formats
 - ***Shockwave Flash Format (SWF)***
 - ***Scalable Vector Graphics (SVG)***

Desktop Video: Computers, Film, and TV

✓ Analog and digital video

- A video digitizer can convert analog video signals from a television broadcast or videotape into digital data.
- Many video digitizers can import signals from televisions, videotapes, video cameras, and other sources.
- **Digital video** cameras capture footage in digital form.
- Digital video can be copied, edited, stored, and played back without any loss of quality.

Video Production Goes Digital

- ✓ Storyboard describes the action, dialogue, and music in each scene.
- ✓ Nonlinear editing of clips stored on the hard disk can be done in any sequence.
- ✓ Video-editing software, such as Adobe Premiere, makes it easy to eliminate extraneous footage, combine clips from multiple takes, insert visual transitions, superimpose titles, synchronize a soundtrack, and create special effects.

Video Production Goes Digital (cont.)

- ✓ After editing, videos can be made into DVDs or Blu-ray movies.
- ✓ Video podcasts and posting to YouTube.com are also ways of distributing your videos.
- ✓ Many videos are distributed for free.

Data Compression

- ✓ Saves storage space
- ✓ Allows the processor to keep up with the quickly changing frames
- ✓ *Image-compression software:* compresses graphics and video files
 - QuickTime
 - Windows Media Player

The Synthetic Musician: Computers and Audio

- ✓ *Synthesized*: digital recording of computer sounds
- ✓ Sound data is sometimes called waveform audio.
 - Recorded sound can consume massive amounts of space on disk and in memory.
 - Higher quality results from higher sampling rates.
 - Number of sound “snapshots” the recording equipment takes each second

Samplers, Synthesizers, and Sequencers: Digital Audio and MIDI

- ✓ ***Synthesizer***: electronic instrument synthesizes sounds using mathematical formulas
- ✓ ***MIDI*** (musical instrument digital interface): standard interface allows electronic instruments and computers to communicate with each other
- ✓ ***Sequencing software***: used to interpret the sequence of MIDI commands

Samplers, Synthesizers, and Sequencers: Digital Audio and MIDI (cont.)

- ✓ A piano-style keyboard sends MIDI signals to the computer; computer interprets the MIDI commands using sequencing software



Samplers, Synthesizers, and Sequencers: Digital Audio and MIDI (cont.)

- ✓ ***Sequencing software:*** turns computer into musical composing, recording, and editing machine
- ✓ ***Virtual instruments:*** instruments that exist only in software
- ✓ ***Electronica:*** music designed from the ground up with digital technology

Digital Audio Dos and Don'ts

- Don't steal
- Understand downloading and streaming
- Know your file formats
- Don't overcompress
- Protect your ears

Digital Audio Dos and Don'ts (cont.)

Format	Description
WAV, AIFF	Standard formats for uncompressed audio for Windows and the Mac OS, respectively. Both formats are supported on Windows, Mac OS, and Linux. Both create large files. Both are lossless—a CD track encoded with WAV or AIFF sounds identical to the original.
MP3	A popular format for transmitting audio on the Internet. A CD track converted to MP3 format can be 1/10 the size of the original—or smaller—but still sound very similar.
WMA	An alternative to MP3 developed by Microsoft for Windows. WMA compression can result in smaller files of higher fidelity. WMA files may be protected by DRM.
AAC	Apple's alternative to MP3 and WMA is used primarily by iTunes and the iTunes Music Store. AAC compression is sonically superior to MP3 compression. AAC files may be protected with DRM.
OGG	Similar to WMA and AAC in sound quality and compression, Ogg Vorbis is open source and freely available—not controlled by any company.

Popular digital audio formats

Hypertext and Hypermedia

- ✓ **Hypertext:** information linked in nonsequential ways
- ✓ **Hypermedia:** combines text, numbers, graphics, animation, sound effects, music, and other media in hyperlinked documents
 - Useful for online Help files
 - Enables the user to jump between documents all over the Internet

Hypertext and Hypermedia (cont.)

- ✓ Hypermedia documents can be disorienting and leave you wondering what you've missed
- ✓ Documents don't always have the links wanted
 - Authors can't build every possible connection into documents
 - Some readers get frustrated because they can't easily get "there" from "here"

Hypertext and Hypermedia (cont.)

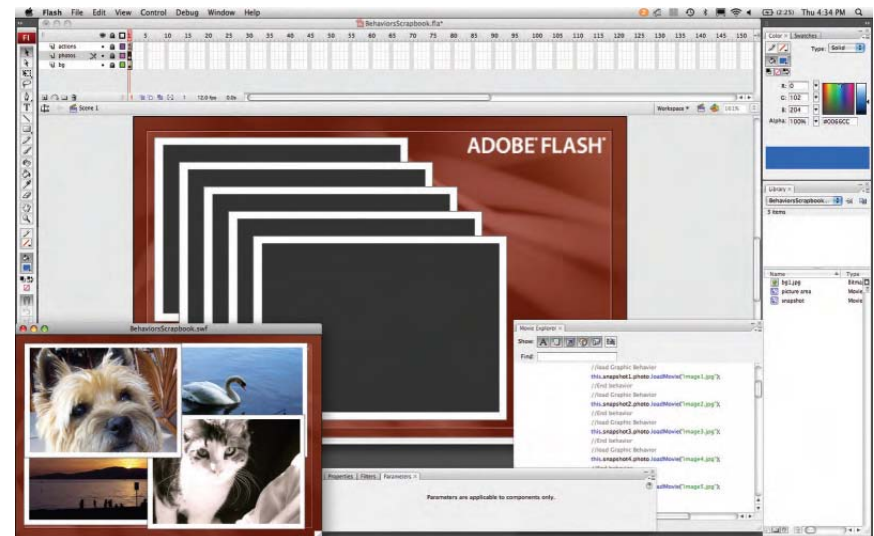
- ✓ Documents sometimes contain “lost” links, especially on the Web, where even a popular page can disappear.
- ✓ Documents don’t encourage scribbled margin notes, highlighting, or turned page corners for marking key passages.
- ✓ Hardware can be hard on humans.
- ✓ The art of hypermedia is still in its infancy.

Interactive Multimedia: Eye, Ear, Hand, and Mind

- ✓ **Multimedia:** combination of text, graphics, animation, video, music, voice, and sound effects allows the user to take an active part in the experience
- ✓ Requirements: high-quality color monitors, fast processors, large memory, CD-ROM drives, speakers, and sound cards
- ✓ Many of today's Web pipelines can't deliver large media files quickly enough

Multimedia Authoring: Making Mixed Media

- ✓ *Multimedia authoring software*: used to create and edit multimedia documents
 - Uses authoring programs such as Adobe Flash
 - Binds source documents together to communicate with users in an aesthetically pleasing way



Creating an Effective Interactive Experience

- Be consistent
- Make it intuitive
- Strive for simplicity
- Keep it lively
- Message more important than the media
- Put the user in the driver's seat
- Let real people test your designs

Interactive Media: Visions of the Future

- ✓ Offers hope communication may become participatory again.
- ✓ Some still fear interactive media will make it possible to be further removed from society.

Inventing the Future: Shared Virtual Spaces

- ✓ *Virtual reality:* combines virtual worlds with networking
 - Places multiple participants in a virtual space
 - People see representations of each other, sometimes called avatars.
 - Most avatars today are cartoonish, but they convey a sense of presence and emotion.

Inventing the Future: Shared Virtual Spaces

- ✓ ***Tele-immersion***: allows multiple-remote users to interact with each other and with computer-generated objects
 - Participants move around in shared virtual spaces, while maintaining their unique points of view.
- ✓ ***AR (augmented reality)***: adds virtual information to your sensory perceptions

Chapter 6 Summary

- ✓ Computer graphics today encompass more than quantitative charts and graphs generated by spreadsheets.
- ✓ Computers today aren't limited to working with static images; they're widely used to create and edit documents in media that change over time or in response to user interaction.
- ✓ The interactive nature of the personal computer makes it possible to create nonlinear documents that enable users to take individual paths through information.

Chapter 6 Summary (cont.)

- ✓ Hypermedia documents are interactive documents that mix text, graphics, sounds, and moving images with on-screen navigation.
- ✓ Multimedia computer systems make a new kind of software possible—software that uses text, graphics, animation, video, music, voice, and sound effects to communicate.

Chapter 6 Summary (cont.)

- ✓ Regardless of the hardware, interactive multimedia software enables the user to control the presentation rather than watch or listen passively.



This work is protected by United States copyright laws and is provided solely for the use of instructors in teaching their courses and assessing student learning. Dissemination or sale of any part of this work (including on the World Wide Web) will destroy the integrity of the work and is not permitted. The work and materials from it should never be made available to students except by instructors using the accompanying text in their classes. All recipients of this work are expected to abide by these restrictions and to honor the intended pedagogical purposes and the needs of other instructors who rely on these materials.

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior written permission of the publisher.

Printed in the United States of America.