

Chapter 1

Defining Information Technology

fluency5

WITH INFORMATION TECHNOLOGY

skills, concepts, & capabilities



PEARSON

ALWAYS LEARNING

Learning Objectives

- Explain why it's important to know the right word
- Relate the connections among hardware, software, “the experience,” and data
- Define basic hardware and software terms



Hardware, Software, and the Experience

- Computing in its most general form concerns data and three phenomena:
 - Hardware
 - Software, and
 - “the experience.”



Hardware, Software, and the Experience

- Hardware:
 - Computers are the physical embodiment of computation.
 - They represent one of the greatest technological achievements.
 - Few inventions are more important.



Hardware, Software, and the Experience

- Software:
 - Embodies the programs that instruct computers in the steps needed to implement applications.
 - Software, unrestricted by the physical world, can direct a computer to do almost anything.



Hardware, Software, and the Experience

- The Experience:
 - Together, hardware and software present a virtual world which we experience.
 - These experiences, dictated by the interaction of the virtual and physical worlds, are new and important.



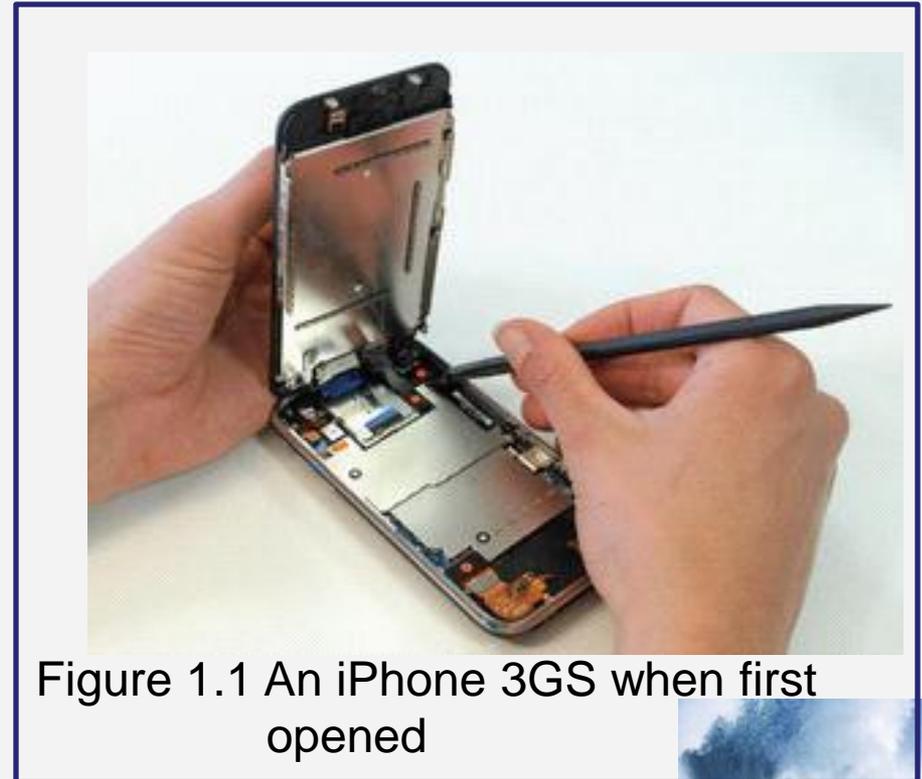
Computers Are Everywhere

- They are in laptops, tablets, smart phones, music players, wireless mics, anti-lock brakes, TV remotes, credit card readers, etc.
 - Through 2010, 24.1 billion ARM processor chips have been shipped
 - It means that every consumer in the developed world owns more than a dozen



Computers Are Everywhere

- Looking Inside:
 - Computers don't always have keyboard and printer attached
- Notice there are metal plates covering its internal parts
 - They shield the surrounding environment from electromagnetic radiation



Computers Are Everywhere

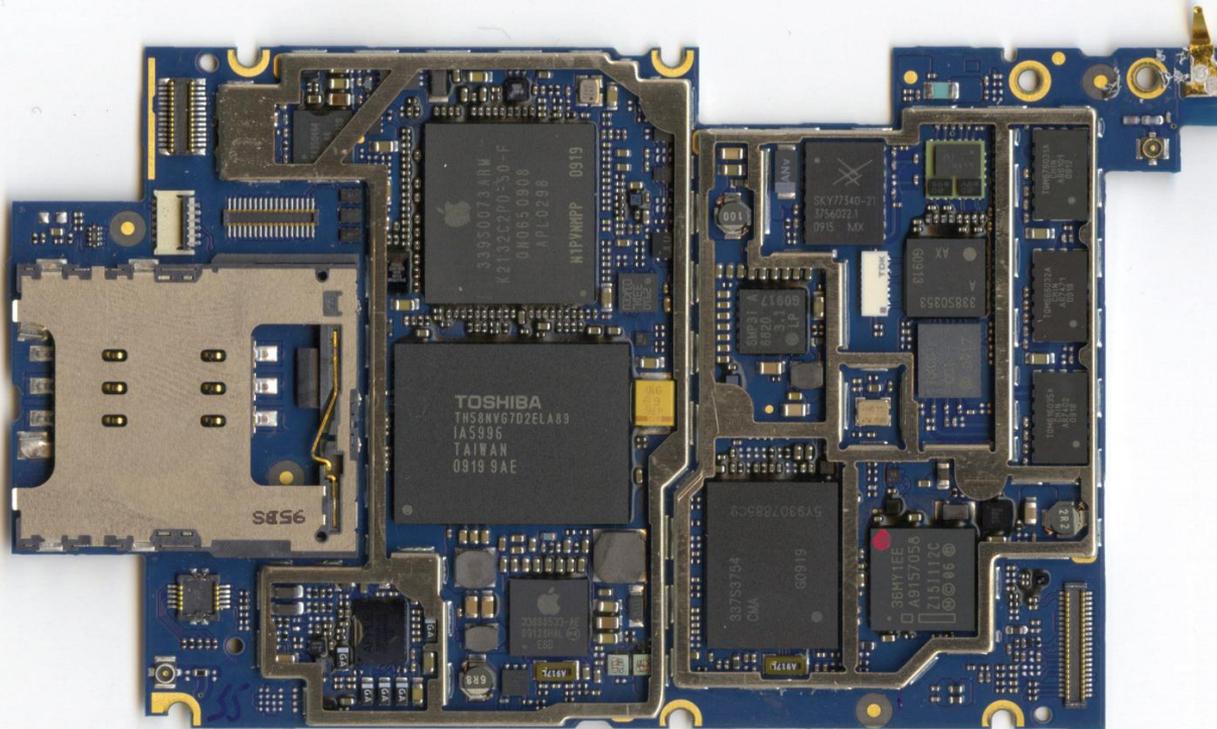


Figure 1.2 Top side of the main printed circuit board in the iPhone 3GS; for orientation, the USB port is at left, and processor and memory IC packages are identified. *32-bit describes the size of a typical operation; GB is short for gigabyte (1 billion bytes).



Software

- Software is a collective term for programs
- Programs are the instructions computers perform to implement applications.
- Software “instructs” the computer (hardware), by providing the steps needed to perform a task.
- The computer follows the program and carries out the instructions



Software

- Software instructs an agent to perform some function or action by giving a step-by-step process.
- The agent is anything that can follow the instructions.
- For software professionals, the agent is a computer.



Digital Information

- Represented by 0s and 1s.
- Transformation
 - It is easy to enhance or embellish digital information
 - Photo editing, video editing, audio remixing are widely practiced
 - *Photoshop* has become a verb describing the act of changing a digital image



Digital Information

- Synthetic Complexity
 - The creation of new digital media means that the information is *synthesized*
 - It is an alternate version of the world
 - Examples: animations, cartoons, video games



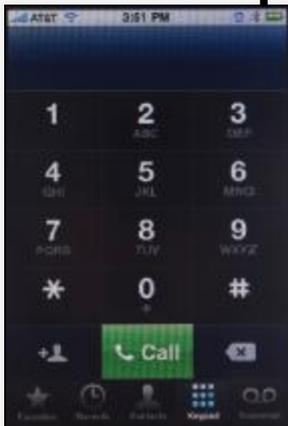
Digital Information

- Synthetic Complexity
 - Advantages?
 - With early animations, each frame was drawn by a person and the music was recorded “live”
 - Contemporary animations are digital art also created one frame at a time, but by a computer
 - A “start scene,” an “ending scene,” and directions on how to modify the *start* to get to the *end* are processed by the computer to create the movie
 - Digital sounds are added and synchronized to the images



Virtual Worlds

- Virtual reality: a world created by computers to *simulate* the physical world
- It is not real, but is perceived “as if” it were
- The full VR experience is still under development...but we see it all the time:



- Keypads on a smart phone display
- Spreadsheet software that look like accounting paper
- GPS displays that show a map



Artificial Worlds

- Everything else that you experience with computers is simply artificial
- Systems like iTunes, Facebook, Twitter, and Angry Birds are entirely the product of human imagination
- This means the creators had almost unlimited flexibility when designing
- This flexibility to create *anything* is one of the exciting aspects of computing



Artificial Worlds

- New Phenomena.
 - Systems, such as Twitter, Facebook, YouTube, give us experiences that did not exist before they were created
 - Some aspects, such as communication via phone and snail mail, did exist
 - They were not equivalent to social networks, primarily because they are either person-to-person, or person-to-tiny group



The Data

- Data vs. Information are interchangeable works in computing
- Physical Form
 - Information is literally everywhere in the physical world
 - Much of it can be captured and converted to digital form.
 - It is always represented as bits (0's and 1's)



The Information You Use

- Most of the information used daily is delivered by the World Wide Web
- Newspapers, TV, magazines, and libraries also deliver information but in a diminishing role
- Some other digital data (like GPS or ATM transactions) is not delivered by the Web



Sourced Content

- Sourced content is content produced for commercial purposes or to fulfill an information dissemination obligation
- Examples include newspapers, shopping, government, celebrities, etc.
- It is content that is entirely controlled by the source organization or person
- The general public cannot add new information to sourced content



Social Content

- Social content refers to information created by visitors to the site
- Examples include the social networking, media sharing, gaming, and reference
- Users generate or contribute to the content of these sites



The Files and Databases

- The digital information we access through the WWW is stored on Web servers around the world as files and databases.
 - Sourced content sites create the files and databases and places them on their own servers
- Databases are everywhere; your digital music (for example, iTunes) is organized as a database, as are your photos



Terms of Endearment

- Not only should you learn the right computing terms, but you should also understand how to use them to benefit completely from the technology.
- There are two practical reasons for this:
 1. Tech Support: Everyone needs and uses it
 2. To learn a new subject, we must learn its terminology



Algorithms

- What's an algorithm?
 - An **algorithm** is a precise, systematic method for producing a specified result
- Important points about algorithms:
 - We use and invent algorithms all the time to solve our problems
 - Often the agent that “runs” the algorithm is a person, NOT a computer



Summary

- Recognize the three-part decomposition of everyday computing: hardware, software, and the experience.
- Recognize Web information sources: sourced and social.
- Determine how close to reality our interactions with computers are by identifying recorded, virtual, and artificial content.
- Know and use the right word because as we learn words, we learn ideas; knowing the right words helps us to communicate.

