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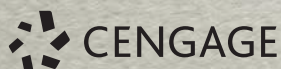
Bidgoli



MIS ^{10TH} EDITION

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MANAGEMENT INFORMATION SYSTEMS

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my father, Mohammad, and my brother, Mohsen,
for their uncompromising belief in the power of
education.—Hossein Bidgoli

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BRIEF CONTENTS

PART 1

Fundamentals of Information Systems 2

- 1 Information Systems in Business 2
- 2 Computers and Their Business Applications 28
- 3 Data and Business Intelligence 54
- 4 Personal, Legal, Ethical, and Organizational Issues 82
- 5 Protecting Information Resources 106

PART 2

Data Communication, the Internet, E-Commerce, and Global Information Systems 136

- 6 Data Communication: Delivering Information Anywhere and Anytime 136
- 7 A Connected World 166
- 8 E-Commerce 196
- 9 Global Information Systems 228

PART 3

IS Development, Enterprise Systems, MSS, and Emerging Trends 248

- 10 Building Successful Information Systems 248
- 11 Enterprise Systems 272
- 12 Supporting Decisions and Processes 298
- 13 Artificial Intelligence and Automation 320
- 14 Emerging Trends, Technologies, and Applications 348

Endnotes 373

Index 392

CONTENTS

Part 1

Fundamentals of Information Systems

1 Information Systems in Business 2

1-1 Computers and Information Systems in Daily Life 3

Smartphones Everywhere and for Everything 4

A New Era of Marketing: YouTube 5

Social Networking and the Vulnerability of Personal Information 6

1-2 Computer Literacy and Information Literacy 7

1-3 The Beginning: Transaction-Processing Systems 7

Information Technologies at Domino's Pizza 8

1-4 Management Information Systems 9

1-5 Major Components of an Information System 9

1-5a Data 9

1-5b Database 10

1-5c Process 11

1-5d Information 11

1-5e Examples of Information Systems 11

1-6 Using Information Systems and Information Technologies 12

Information Technologies at Home Depot 12

1-6a The Importance of Information Systems 13

Human Resource Information Systems in Action 13

Information Technologies at UPS 14

1-6b Using Information Technologies for a Competitive Advantage 15

Information Technologies at Walmart 16

1-6c Porter's Five Forces Model: Understanding the Business Environment 17

Information Technologies at Netflix 18

Digital Innovation in Retail Industry Using Information Technologies 19

1-7 The IT Job Market 20

1-7a CTO/CIO 21

1-7b Manager of Information Systems Services 21

1-7c Systems Analyst 21

1-7d Network Administrator 21

1-7e Database Administrator 21

1-7f Computer Programmer 21

1-7g Webmaster 21

1-8 Outlook for the Future 22

Module Summary 24

Key Terms 24

Reviews and Discussions 25

Projects 25

Module Quiz 25

Case Study 1-1: Using Information Technologies at Federal Express 26

Case Study 1-2: Mobile Technology: A Key Player for Future Shopping 26

2 Computers and Their Business Applications 28

2-1 Defining a Computer 29

2-1a Components of a Computer System 30

2-2 The History of Computer Hardware and Software 31

IBM Watson: A Supercomputer with Artificial Intelligence Capabilities 33

2-3 The Power of Computers 33

2-3a Speed 33

2-3b Accuracy 34

2-3c Storage and Retrieval 34

2-4 Computer Operations 34

A Supercomputer in Your Pocket 35

2-5 Input, Output, and Memory Devices 35

2-5a Input Devices 35

Touchless Computing: The New Paradigm in User System Interface 36

2-5b Output Devices 37

2-5c Memory Devices 38

2-6 Classes of Computers 40

Summit: The Fastest Supercomputer in the World 40

Popular iPad Business Applications 41

2-6a Server Platforms: An Overview 42

Ubiquitous Computing 42

2-7 What Is Software? 43

Microsoft Office 365: Making Data and Applications Portable 43

2-7a Operating System Software 44

iOS: The Brain Behind Apple Devices 44

2-7b Application Software 45

2-8 Computer Languages 47

2-9 Object-Oriented Programming: A Quick Overview 48

Module Summary 50

Key Terms 50

Reviews and Discussions 51

Projects 51

Module Quiz 51

Case Study 2-1: Become Your Own Banker and Financial Advisor 52

Case Study 2-2: iPads: New Productivity Tools for Service Workers 53

3 Data and Business Intelligence 54

3-1 Databases 55

3-1a Types of Data in a Database 56

BI in Action: Law Enforcement 57

3-1b Methods for Accessing Files 57

3-2 Logical Database Design 58

3-2a The Relational Model 60

3-3 Components of a DBMS 61

3-3a Database Engine 61

3-3b Data Definition 61

3-3c Data Manipulation 61

Graph Databases Move Relational Databases One Step Forward 62

3-3d Application Generation 63

3-3e Data Administration 63

3-4 Recent Trends in Database Design and Use 64

3-4a Data-Driven Web Sites 64

3-4b Distributed Databases 64

3-4c Object-Oriented Databases 65

3-5 Data Warehouses 66

Data Warehouse Applications at Marriott International 66

3-5a Input 67

3-5b ETL 67

3-5c Storage 68

3-5d Output 68

3-6 Data Marts 69

Data Mining and the Airline Industry 70

3-7 Business Analytics 70

Mobile Analytics in Action: Airbnb 71

3-8 The Big Data Era 72

Predictive Analytics in Action 72

3-8a Who Benefits from Big Data? 73

3-8b Tools and Technologies of Big Data 73

3-8c Big Data Privacy Risks 73

Big Data in Action 74

3-8d Integration of IoT with Big Data Analytics 74

3-9 Database Marketing 75

Database Marketing in Action: Caterpillar Corporation 76

3-10 Tableau and Power BI: Two Popular BI and Visualization Platforms 77

3-10a What Is Tableau? 77

3-10b What Is Power BI? 77

Module Summary 78

Key Terms 79

Reviews and Discussions 79

Projects 80

Module Quiz 80

Case Study 3-1: Data Mining Helps Students Enroll in Courses with Higher Chances of Success 81

Case Study 3-2: Data Mining Tools at Pandora Radio 81

4 Personal, Legal, Ethical, and Organizational Issues 82

4-1 Privacy Issues 83

Social Networking Sites and Privacy Issues 83

Employee Monitoring: Improving Productivity or Invasion of Privacy? 84

4-1a General Data Protection Regulation (GDPR) 87

4-1b E-mail 87

4-1c Data Collection on the Web 88

E-Mail and Corporate Data Leakage 88

A Significant Unethical Behavior at Facebook 89

4-2 Ethical Issues of Information Technologies 90

Ten Commandments of Computer Ethics 91

4-2a Computer Networks Ethics 92

4-2b Censorship 92

4-2c Intellectual Property 93

Software Piracy: A Global Problem 95

4-2d Social Divisions and the Digital Divide 96

Cybersquatting is on the Rise 96

4-3 The Impact of Information Technology in the Workplace 97

The Digital Divide in Action 97

4-3a Information Technology and Health Issues 99

Health and Social Issues of Online Gaming 99

4-4 Green Computing 101

Module Summary 102

Key Terms 103

Reviews and Discussions 103

Projects 103

Module Quiz 104

Case Study 4-1: Telecommuting with a New Twist 104

Case Study 4-2: Privacy and Other Legal Issues at Google 105

5 Protecting Information Resources 106

5-1 Risks Associated with Information Technologies 107

5-1a The Costs of Cyber Crime to the Global Economy 107

5-1b Spyware and Adware 107

5-1c Phishing, Pharming, Baiting, Quid Pro Quo, SMiShing, and Vishing 108

5-1d Keystroke Loggers 108

5-1e Sniffing and Spoofing 108

5-1f Computer Crime and Fraud 108

Challenges of Insiders' Threats 109

Identity Theft at the Internal Revenue Service 110

Types of Hackers 111

5-2 Computer and Network Security: Basic Safeguards 111

Nearly All Organizations Get Hacked 112

5-3 Security Threats: An Overview 113

5-3a Intentional Threats 113

Protecting Against Data Theft and Data Loss 115

Google and Facebook were victims of Social Engineering 116

5-4 Security Measures and Enforcement: An Overview 118

5-4a Biometric Security Measures 118

Biometrics at Phoebe Putney Memorial Hospital 119

Face Recognition Technology in Action 120

5-4b Nonbiometric Security Measures 121

5-4c Physical Security Measures 123

5-4d Access Controls 124

Lost and Stolen Laptops 125

5-4e Virtual Private Networks 126

5-4f Data Encryption 126

5-4g E-Commerce Transaction Security Measures 128

5-4h Computer Emergency Response Team 128

5-4i Zero Trust Security 129

5-5 Guidelines for a Comprehensive Security System 129

5-5a Business Continuity Planning 130

Sarbanes-Oxley and Information Security 130

Module Summary 132

Key Terms 132

Reviews and Discussions 133

Projects 133

Module Quiz 134

Case Study 5-1: Vulnerabilities of Medical Devices 134

Case Study 5-2: Security Breach at Equifax 135

Part 2

Data Communication, the Internet, E-Commerce, and Global Information Systems

6 Data Communication: Delivering Information Anywhere and Anytime 136

6-1 Defining Data Communication 137

6-1a Why Managers Need to Know About Data Communication 137

GoToMeeting: Example of an E-Collaboration Tool 138

6-2 Basic Components of a Data Communication System 138

6-2a Sender and Receiver Devices 139

6-2b Modems 139

6-2c Communication Media 139

6-3 Processing Configurations 141

6-3a Centralized Processing 141

6-3b Decentralized Processing 141

6-3c Distributed Processing 141

Google Invests in Communication Media 141

6-3d Open Systems Interconnection Model 142

6-4 Types of Networks 143

6-4a Local Area Networks 143

6-4b Wide Area Networks 143

6-4c Metropolitan Area Networks 144

6-5 Network Topologies 145

6-5a Star Topology 145

- 6-5b Ring Topology 145
- 6-5c Bus Topology 146
- 6-5d Hierarchical Topology 146
- 6-5e Mesh Topology 147

6-6 Major Networking Concepts 147

- 6-6a Protocols 147
- 6-6b Transmission Control Protocol/Internet Protocol 147
- 6-6c Routing 148
- 6-6d Routers 149
- 6-6e Client/Server Model 149

6-7 Wireless and Mobile Networks 152

Mobile Computing and Mobile Apps 153

- 6-7a Wireless Technologies 153
- 6-7b Wi-Fi 154
- 6-7c WiMAX 154
- 6-7d Bluetooth 154
- 6-7e Mobile Networks 155

Mobile Computing in Action: The Apple iPhone 157

6-8 Wireless Security 157

Privacy and Ethical Issues of Mobile Devices 158

6-9 Convergence of Voice, Video, and Data 158

Telepresence: A New Use of Data Communication and Convergence 159

Module Summary 160

Key Terms 161

Reviews and Discussions 162

Projects 162

Module Quiz 163

Case Study 6-1: Data Communication at Walmart 163

Case Study 6-2: Protecting the Security and Privacy of Mobile Devices 164

7 A Connected World 166

7-1 The Internet 167

- 7-1a The Domain Name System 168

Major Events in the Development of the Internet 169

- 7-1b Types of Internet Connections 170

What Is HTML? 171

7-2 Navigational Tools, Search Engines, and Directories 171

- 7-2a Navigational Tools 172
- 7-2b Search Engines and Directories 172

7-3 Internet Services 173

- 7-3a E-Mail 174
- 7-3b Newsgroups and Discussion Groups 174
- 7-3c Instant Messaging 174
- 7-3d Internet Telephony 175

7-4 Web Applications 175

- 7-4a Tourism and Travel 175
- 7-4b Publishing 175
- 7-4c Higher Education 175
- 7-4d Real Estate 176
- 7-4e Employment 176
- 7-4f Financial Institutions 176
- 7-4g Software Distribution 177
- 7-4h Health Care 177

Electronic Health Records Pay Off for Kaiser Permanente 178

- 7-4i Politics 178

7-5 Intranets 179

- 7-5a The Internet versus Intranets 180
- 7-5b Applications of an Intranet 180

7-6 Extranets 180

10 Best Intranets of 2019 181

7-7 The Web Trends 183

- 7-7a Blogs 183
- 7-7b Wikis 183

LinkedIn: A Professional Social Networking Site 184

- 7-7c Social Networking Sites 184
- 7-7d Business Application of Social Networks 185

Social Media Applications at Walmart 185

- 7-7e RSS Feeds 186
- 7-7f Podcasting 186

Twitter: Real-time Networking with Your Followers 187

7-8 The Internet of Everything and Beyond 188

The Internet of Things in Action 189

Module Summary 192

Key Terms 193

Reviews and Discussions 193

Projects 194

Module Quiz 194

Case Study 7-1: Scotts Miracle-Gro's Intranet: The Garden 194

Case Study 7-2: Social Networking in Support of Small Businesses 195

8 E-Commerce 196

8-1 Defining E-Commerce 197

8-1a The Value Chain and E-Commerce 197

Using Instagram to Promote Your Products and Services 199

Showrooming and Webrooming 200

8-1b E-Commerce versus Traditional Commerce 200

8-1c Advantages and Disadvantages of E-Commerce 201

The Home Depot Gets into E-Commerce 201

8-1d E-Commerce Business Models 202

E-Commerce in 2025 203

8-2 Major Categories of E-Commerce 204

8-2a Business-to-Consumer E-Commerce 204

8-2b Business-to-Business E-Commerce 204

8-2c Consumer-to-Consumer E-Commerce 204

8-2d Consumer-to-Business E-Commerce 205

8-2e Government and Nonbusiness E-Commerce 205

8-2f Organizational or Intra-business E-Commerce 206

8-3 B2C E-Commerce Cycle 206

8-3a B2C E-Commerce Evolution: Multichannel, Cross-Channel, and Omnichannel 207

8-4 B2B E-Commerce: A Second Look 209

8-4a Major Models of B2B E-Commerce 209

E-Procurement at Schlumberger 210

B2B E-Commerce Growth and Best Practices 211

8-5 Mobile and Voice-Based E-Commerce 211

Mobile Commerce in Action: Fast-Food Restaurants 212

8-6 E-Commerce Supporting Technologies 213

8-6a Electronic Payment Systems 213

Challenges in Using Mobile Payment Systems 214

8-6b Web Marketing 215

8-6c Mobile Marketing 216

Mobile Marketing at Starbucks 216

8-6d Search Engine Optimization 217

Challenges in Using Digital Ads 217

8-7 E-Commerce and Beyond: Social Commerce 218

Social Commerce at Coca-Cola Company 219

8-8 Hypersocial Organizations 219

8-9 Social Media Information Systems 220

Hyper-Social Organization in Action: Spotify 221

Module Summary 223

Key Terms 223

Reviews and Discussions 224

Projects 224

Module Quiz 225

Case Study 8-1: Widespread Applications of Mobile Ads 225

Case Study 8-2: Bridging the Gap Between E-Commerce and Traditional Commerce 226

9 Global Information Systems 228

9-1 Why Go Global? 229

Global Information Systems at Rohm & Haas 230

9-1a E-Business: A Driving Force 230

9-1b Growth of the Internet 230

Making a Company Web Site Global 231

Global Internet: Presents a Huge Payoff for Global E-commerce 232

9-1c The Rise of Non-English Speakers on the Internet 232

9-1d Mobile Computing and Globalization 233

9-2 Global Information Systems: An Overview 233

9-2a Components of a Global Information System 234

The Internet and Globalization in Action 235

9-2b Requirements of Global Information Systems 235

Video-Conferencing Systems Support Globalization 236

Globalization in Action: Alibaba 237

9-2c Implementation of Global Information Systems 237

9-3 Organizational Structures and Global Information Systems 238

9-3a Multinational Structure 238

9-3b Global Structure 238

9-3c International Structure 239

9-3d Transnational Structure 240

9-3e Global Information Systems Supporting Offshore Outsourcing 241

Global Information System at FedEx 241

9-4 Obstacles to Using Global Information Systems 242

9-4a Lack of Standardization 242

9-4b Cultural Differences 243

9-4c Diverse Regulatory Practices 243

9-4d Poor Telecommunication Infrastructures 244

9-4e Lack of Skilled Analysts and Programmers 244

Module Summary 245

Key Terms 245

Reviews and Discussions 245

Projects 246

Module Quiz 246

Case Study 9-1: Global Information Systems at Toyota Motor Company 246

Case Study 9-2: Information Technologies Support Global Supply Chain 247

Part 3

IS Development, Enterprise Systems, MSS, and Emerging Trends

10 Building Successful Information Systems 248

10-1 Systems Development Life Cycle: An Overview 249

10-2 Phase 1: Planning 249

10-2a Formation of the Task Force 251

10-2b Feasibility Study 251

A Feasible Project Becomes Unfeasible 252

10-3 Phase 2: Requirements Gathering and Analysis 254

10-4 Phase 3: Design 256

10-4a Computer-Aided Systems Engineering 256

10-4b Prototyping 257

10-5 Phase 4: Implementation 259

10-5a IT Project Management 259

10-5b Request for Proposal 260

Preventing IT Project Failures Using Best Practices 262

10-5c Implementation Alternatives 263

10-6 Phase 5: Maintenance 265

10-7 New Trends in Systems Analysis and Design 265

10-7a Service-Oriented Architecture 265

10-7b Rapid Application Development 266

10-7c Extreme Programming 266

Extreme Programming in Action 266

10-7d Agile Methodology 267

Agile Methodology at HomeAway, Inc. 268

Module Summary 268

Key Terms 269

Reviews and Discussions 270

Projects 270

Module Quiz 270

Case Study 10-1: Systems Development at SEB Latvia 271

Case Study 10-2: Crowdsourcing Pays Off 271

11 Enterprise Systems 272

11-1 Supply Chain Management 273

11-1a SCM Technologies 274

Supply Chain Management at Coca-Cola Company 275

Green SCM in Action: Walmart 276

3D Printing in Action: The Medical Field 280

Coca-Cola Company Uses RFID-Based Dispensers for Generating Business Intelligence 283

QR Codes in Action 284

11-1b Global Supply Chain Management 285

11-2 Customer Relationship Management 285

11-2a CRM Applications 286

CRM at Delta Air Lines 287

11-2b Personalization Technology 288

Amazon's Personalization Assists Sellers on Its Marketplace 289

11-3 Knowledge Management 290

11-4 Enterprise Resource Planning 291

Knowledge Management in Action 291

11-5 Cloud-Based Enterprise Systems 293

ERP Streamlines Operations at Naghi Group 293

Module Summary 295

Key Terms 295

Reviews and Discussions 295

Projects 296

Module Quiz 296

Case Study 11-1: ERP at Johns Hopkins Institutions 297

Case Study 11-2: CRM at Starbucks 297

12 Supporting Decisions and Processes 298

12-1 Types of Decisions in an Organization 299

12-1a Phases of the Decision-Making Process 299

12-2 Decision Support Systems 301

12-2a Components of a Decision Support System 301

12-2b DSS Capabilities 302

12-2c Roles in the DSS Environment 303

12-2d Costs and Benefits of Decision Support Systems 304

12-3 Executive Information Systems 304

Decision Support Systems at Family Dollar 305

12-3a Reasons for Using EISs 307

12-3b Avoiding Failure in Design and Use of EISs 307

Executive Information Systems at Hyundai Motor Company 308

12-4 Geographic Information Systems 308

12-4a GIS Applications 310

12-5 Collaboration Systems 310

GISs for Fighting Disease 311

12-5a Types of Collaboration Software 312

New Generations of Video-Conferencing Systems 313

Microsoft Office SharePoint Server: A Popular Collaboration Platform 314

12-5b Which Collaboration Software Is Right for You? 314

Remote Collaboration with Google Apps for Work 315

12-6 Guidelines for Designing a Management Support System 315

Module Summary 316

Key Terms 317

Reviews and Discussions 317

Projects 317

Module Quiz 318

Case Study 12-1: UPS Deploys Routing Optimization with a Big Payoff 318

Case Study 12-2: GPS Technology and Analytics Combat Crime 319

13 Artificial Intelligence and Automation 320

13-1 What Is Artificial Intelligence? 321

13-1a AI Technologies Supporting Decision Making 321

Computers Understanding Common Sense 322

AI in Action: Retail Industry 323

13-1b Robotics 324

13-2 Expert Systems 325

Medical Robotics in Action 326

13-2a Components of an Expert System 327

13-2b Uses of Expert Systems 329

Expert Systems in the Baltimore County Police Department 329

13-2c Criteria for Using Expert Systems 330

13-2d Criteria for Not Using Expert Systems 330

13-2e Advantages of Expert Systems 330

13-3 Case-Based Reasoning 330

13-4 Intelligent Agents 331

13-4a Shopping and Information Agents 331

13-4b Personal Agents 332

13-4c Data-Mining Agents 332

Intelligent Agents in Action 332

13-4d Monitoring and Surveillance Agents 333

13-5 Fuzzy Logic 333

13-5a Uses of Fuzzy Logic 334

Fuzzy Logic in Action 335

13-6 Machine Learning 335

13-7 Genetic Algorithms 336

Neural Networks in Microsoft and the Chicago Police Department 337

13-8 Natural-Language Processing 338

13-9 Integrating AI Technologies Into Decision Support Systems 338

NLP in Action: The Health Care Industry 339

13-10 Contextual Computing: Making Mobile Devices Smarter 339

AI Technologies for Decision Making 340

Contextual Computing in Action 341

13-11 AI and Automation 341

13-12 Ethical issues of AI 342

Module Summary 344

Key Terms 345

Reviews and Discussions 345

Projects 345

Module Quiz 346

Case Study 13-1: AI-Based Software Helps Businesses Better Understand Customers 346

Case Study 13-2: NLP: Making a Smartphone Smarter 347

14 Emerging Trends, Technologies, and Applications 348

14-1 Trends In Software and Service Distribution 349

14-1a Pull and Push Technologies 349

14-1b Application Service Providers 350

14-2 Virtual Reality 351

14-2a Types of Virtual Environments 352

14-2b Components of a Virtual Reality System 352

14-2c	CAVE	353
14-2d	Virtual Reality Applications	353
Virtual Reality at Lockheed Martin 354		
14-2e	Obstacles in Using VR Systems	355
14-2f	Virtual Worlds	355
14-2g	Augmented Reality	356
14-2h	Mixed Reality	357
Mixed Reality in Action 358		
14-3 Cloud Computing: Foundation, Applications, and Models 358		
14-3a	Grid Computing	359
14-3b	Utility (On-Demand) Computing	359
14-3c	Cloud Computing	360
14-3d	Cloud Computing Components	360
Cloud Computing in Support of Small Businesses 361		
14-3e	Cloud Computing Alternatives	362
14-3f	Edge Computing	362
Edge Computing in Action 363		
14-3g	Cloud Computing Security	364

14-4 Nanotechnology 364	
14-5 Blockchain Technology and Cryptocurrency 365	
	Blockchain Technology in Action: Walmart and Alibaba 366
14-6 Quantum Computing 367	
	14-6a Popular Applications of Quantum Computing 368
Module Summary 369	
Key Terms 370	
Reviews and Discussions 370	
Projects 370	
Module Quiz 371	
Case Study 14-1: Cloud Computing at Intercontinental Hotels Group (IHG) 371	
Case Study 14-2: Virtual Reality Enhances Try Before You Buy Concept 372	
Endnotes 373	
Index 392	

PART 1

1 Information Systems in Business

LEARNING OBJECTIVES

After studying this module, you should be able to . . .

- 1-1** Discuss common applications of computers and information systems.
- 1-2** Explain the differences between computer literacy and information literacy.
- 1-3** Define transaction-processing systems.
- 1-4** Define management information systems.
- 1-5** Describe the four major components of an information system.
- 1-6** Discuss the differences between data and information.
- 1-7** Explain the importance and applications of information systems in functional areas of a business.
- 1-8** Analyze how information technologies are used to gain a competitive advantage.
- 1-9** Apply the Five Forces Model and strategies for gaining a competitive advantage.
- 1-10** Review the IT job market.
- 1-11** Summarize the future outlook of information systems.



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This module starts with an overview of common uses for computers and information systems, explains the difference between computer literacy and information literacy, and reviews transaction-processing systems as one of the earliest applications of information systems.

Next, the module discusses the components of a management information system, including data, databases, processes, and information, and then delves into how information systems relate to information technologies. This module also covers the roles and applications of information systems and explains the Five Forces Model, which is used to develop strategies for gaining a competitive advantage. Finally, the module reviews the IT job market and touches on the future of information systems.

Organizations use computers and information systems to reduce costs and gain a competitive advantage in the marketplace.

1-1 COMPUTERS AND INFORMATION SYSTEMS IN DAILY LIFE

Organizations use computers and information systems to reduce costs and gain a competitive advantage in the marketplace. Throughout this book, you will study many information system applications. For now, you will look at some common applications used in daily life.

Computers and information systems are all around you. As a student, you use computers and office suite software and might take online classes. Computers are often used to grade your exam answers and generate detailed reports comparing the performance of each student in your class. Computers and information systems also calculate grades and grade point averages (GPAs) and can deliver this information to you.

Computers and information systems are commonly used in grocery and retail stores as well. For example, a point-of-sale (POS) system speeds up service by reading the universal product codes (UPCs) on items in your shopping cart (see Exhibit 1.1). This same system also manages store inventory, and some information

systems can even reorder stock automatically. Banks, too, use computers and information systems for generating your monthly statement, running automatic teller machines (ATMs), and for many other banking activities.

Many workers are now telecommuters who perform their jobs at home, and others often use their mobile devices to conduct business while on the go. The most common mobile device is a smartphone (such as an iPhone, Galaxy, or Droid). Smartphones are mobile phones with advanced capabilities, much like a mini-PC.

Exhibit 1.1
A point-of-sale system



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They include e-mail and Web-browsing features, and most have a built-in keyboard or an external USB keyboard (see Exhibit 1.2). Tablet computers, such as iPads, are increasingly being used. These tablets come with apps (small programs) for common applications, and they can improve the user's efficiency. The "Smartphones Everywhere and for Everything" box highlights several popular applications of smartphones.

The Internet is used for all kinds of activities, from shopping to learning to working. Search engines and broadband communication bring information to your desktop in seconds. The Internet is also used for social purposes. With social networking sites—such as Facebook, Twitter, LinkedIn, and Foursquare—you can connect with friends, family, and colleagues online and meet people with similar interests and hobbies. Twitter (*www.twitter.com*), for example, is a social networking and short-message service. Users can send and receive brief text updates, called Tweets. These posts are displayed on one's profile page, and other users can sign up to have them delivered to their inboxes. As an example, the author of this textbook sends daily Tweets that consist of links to current articles

Exhibit 1.2
Examples of smartphones



Smartphones Everywhere and for Everything

► FINANCE | TECHNOLOGY IN SOCIETY | APPLICATION

With the growing number of apps available for both iPhones and Android phones, individuals and businesses are using their smartphones as a productivity tool and as an intelligent assistant for all sorts of activities. Here are a few popular examples.

Group texting app GroupMe is used for sending a message to a group of employees or customers. The Samsung iPolis app, a video camera security system, is used to remotely watch the video that monitors the location of a business or home. Apps are available to pay bills, update a company's Web site, market and advertise a product or service, reach out to customers, and keep in touch with employees from anywhere. Some businesses give out their Google Voice phone number to customers so that they can text an order. Google's calendar is used to coordinate events, and Instagram is used to post photos of new merchandise.¹

According to Massimo Marinucci, the owner and president of The Wine Connection, a \$20-million business with six employees, the iPhone does nearly everything for business that a desktop used to do. Using their iPhones, employees check inventory, view sales for the day, run reports, print, change prices, and change inventory quantities. The new point-of-sale (POS) app allows customers to buy immediately as soon as a new wine becomes available.²

Starwood Hotels & Resorts Worldwide, Inc., plans to offer customers of two of its hotels in Harlem, New York, and Cupertino, California, a virtual key. Guests can bypass the crowded check-in desk and enter their rooms using their smartphones. Guests receive a message on Starwood's app that will unlock their rooms with a tap or twist of their smartphones, using Bluetooth technology. Marriott International, Inc., also does mobile check-ins at some of their hotels. Loyalty program customers can check in via their smartphones and then go to a separate check-in desk to pick up a key.³

Questions and Discussions

1. What are two iPhone applications and related apps for The Wine Connection?
2. What are two advantages of mobile check-ins?

about information systems applications, new developments, breaking news, IT jobs, and case examples. You can read these Tweets in Twitter, Facebook, or LinkedIn.

Organizations also use social networking sites to give customers up-to-date information and how-to support via videos. These sites can reduce organizations' costs by providing an inexpensive medium for targeting a large customer base.

In the 21st century, knowledge workers need two types of knowledge to be competitive in the workplace: computer literacy and information literacy.

In addition, people use video-sharing sites to watch news, sporting events, and entertainment videos. One of the most popular sites is YouTube (www.youtube.com).

You can upload and share video clips via Web sites, mobile devices, blogs, and e-mails. Users upload most of the content on YouTube, although media corporations such as CBS, BBC, Sony Music Group, the Sundance Channel, and others also provide content. Anyone can watch videos on YouTube,

A New Era of Marketing: YouTube

► FINANCE | TECHNOLOGY IN SOCIETY | APPLICATION | GLOBAL

Companies use newspapers, magazines, TV shows, and search engines to promote their products, services, and brands. YouTube is a popular video-sharing service that can be used as a marketing tool. The videos on YouTube are very well indexed and organized. They are categorized and sorted by “channels.” The channels range from film and animation to sports, short movies, and video blogging. Individual YouTube users have used this marketing tool to share videos and stories. One popular application is watching how-to videos for repairing cars, home appliances, and so forth. Corporations can also take advantage of this popular platform. YouTube represents a great opportunity for marketers to reach consumers who are searching for information about a brand or related products and services. The service can also be used as a direct-marketing tool. The following are examples of corporations that are using YouTube to promote their products and services:

Quiksilver—This manufacturer of apparel and accessories, including the Roxy brand, frequently posts new videos of its products, continually renewing its Web presence.

Ford Models—Since 2006, it has uploaded hundreds of videos promoting its brand.

University of Phoenix Online—This site has hundreds of video testimonials, reviews, and documentaries that promote the university's degree programs.

The Home Depot—Free content, including practical knowledge and money-saving tips for home improvements, may be found at this site.

Nikefootball—Nike maintains several distinct YouTube channels that cater to specific audiences. Consumers can find what is relevant to their needs without having to sift through a lot of content.^{4,5}

However, there are some challenges in using YouTube as an advertising medium. In 2017, several companies—including Starbucks, Pepsi, AT&T, Verizon, Johnson & Johnson, Volkswagen, and Walmart—pulled YouTube ads after they were placed on racist and other unpleasant videos.⁶

In 2018, YouTube faced obstacles in their effort to restrain fraudulent content, similar to other social media such as Facebook and Google.⁷ In 2019, Nestle, Disney, and several other companies suspended YouTube ads over news of a pedophile network on the site.⁸ Alphabet, the parent company of YouTube, has taken steps to fix this problem by involving more people in reviewing videos and developing more sophisticated algorithms to instruct its computers to eliminate this problem.

Questions and Discussions

1. What are two advantages of using YouTube as a marketing tool?
2. What are two challenges of using YouTube as a marketing tool?



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but you must register to upload videos. (This book has a YouTube channel on which you can watch many practical videos related to information systems.) Businesses are increasingly using YouTube to promote their products

the terms *information systems* and *information technologies* are used interchangeably. Information systems are broader in scope than information technologies, but the two overlap in many areas. Both are used to help organizations be

and services. See the “A New Era of Marketing: YouTube” box, which highlights a few such companies.

So what do all these examples mean to you? Computers and information technology will help the knowledge workers of the future perform more effectively and productively, no matter what profession they choose. In addition, these workers will be able to connect to the rest of the world to share information, knowledge, videos, ideas, and almost anything else that can be digitized. Throughout this book, these opportunities, as well as the power of computers and information systems, are explored.

As you read, keep in mind that

Social Networking and the Vulnerability of Personal Information

► TECHNOLOGY IN SOCIETY | APPLICATION | SOCIAL AND ETHICAL ISSUES

The popularity of social networking sites such as Facebook, Twitter, Snapchat, and Foursquare is on the rise. As of July 2019, worldwide, there are over 2.38 billion monthly active users (MAU) for Facebook, and the number is increasing on a daily basis.⁹ But so is the potential risk. According to an InfoWorld study, over half of all users of social networks in this country are putting themselves at risk by posting information that could be misused by cybercriminals. Many social networkers post their full birth dates, their home addresses, photos of themselves and their families, and the times when they will be away from home. This information could be used by cybercriminals for malicious purposes. According to the report, 9 percent of the 2,000 people who participated in the study had experienced some kind of computer-related trouble, such as malware infections, scams, identity theft, or harassment. To reduce risk and improve the privacy of your personal information, the study offers several tips:¹⁰

- Always use the privacy controls offered by social networking sites.
- Use long passwords (12 characters or longer) that mix uppercase and lowercase letters with numbers and symbols.
- Do not post a phone number or a full address.
- Do not post children’s names, even in photo tags or captions.
- Do not be specific when posting information about vacations or business trips.

Questions and Discussions

1. What are three examples of popular social networking sites?
2. What are three recommendations for reducing risk and improving the privacy of your personal information when using social media?

more competitive and to improve their overall efficiency and effectiveness. Information technologies offer many advantages for improving decision making but involve some challenges, too, such as security and privacy issues. The “Social Networking and the Vulnerability of Personal Information” box describes one of the potential challenges.

1-2 COMPUTER LITERACY AND INFORMATION LITERACY

In the 21st century, knowledge workers need two types of knowledge to be competitive in the workplace: computer literacy and information literacy. **Computer literacy** is skill in using productivity software, such as word processors, spreadsheets, database management systems, and presentation software, as well as having a basic knowledge of hardware and software, the Internet, and collaboration tools and technologies. **Information literacy**, on the other hand, is understanding the role of information in generating and using business intelligence. **Business intelligence (BI)** is more than just information. It provides historical, current, and predictive views of business operations and environments and gives organizations a competitive advantage in the marketplace. (BI is discussed in more detail in Module 3.) To summarize, knowledge workers should know the following:

- Internal and external sources of data
- How data is collected
- Why data is collected
- What type of data should be collected
- How data is converted to information and eventually to business intelligence
- How data should be indexed and updated
- How data and information should be used to gain a competitive advantage

1-3 THE BEGINNING: TRANSACTION-PROCESSING SYSTEMS

For the past 60 years, **transaction-processing systems (TPS)** have been applied to structured tasks such as record keeping, simple clerical operations, and inventory control. Payroll, for example, was one of the first applications to be automated. TPS focus

on data collection and processing, and they have provided enormous reductions in costs.

Computers are most beneficial in transaction-processing operations. These operations are repetitive, such as printing numerous checks, or involve enormous volumes of data, such as inventory control in a multinational textile company. When these systems are automated, human involvement is minimal. For example, in an automated payroll system, there is little need for managerial judgment in the task of printing and sending checks, which reduces personnel costs.

Transaction-processing systems have come a long way. For example, the first ATM opened for business in 1969 with some very basic features. Similar to other information technologies, ATMs have gone through major changes and improvements.¹¹ Later, JPMorgan Chase introduced electronic banking kiosks (EBKs). Using these kiosks customers can withdraw cash in a variety of denominations (\$10, \$20, ...). These machines also allow customers to cash a check and receive exact change.¹² Customers can be identified using biometric features such as scanning a fingerprint or the iris of an eye.¹³

The cardless ATM is one of the recent technologies deployed by some banks in order to attract younger customers. An app provided by the bank is used to withdraw cash. The customers set the amount using the app and receive a code on his or her smartphone that is scanned by the bank's ATM when the customer gets there. The ATM dispenses the cash and sends a receipt over the phone, or it can be printed at the ATM.¹⁴

According to the Chicago-based BMO Harris Bank, mobile withdrawal reduces fraud and also increases efficiency, as a mobile cash transaction takes 15 seconds compared to 45 seconds for a card-based withdrawal.¹⁵

JPMorgan Chase says upcoming ATM features will include cash withdrawals by tapping smartphones to the ATM, the technology similar to Apple Pay; withdrawals of up to \$3,000 on some ATMs; and allowing customers to make their credit card and mortgage payments at the ATM.¹⁶

Computer literacy is skill in using productivity software, such as word processors, spreadsheets, database management systems, and presentation software, as well as having a basic knowledge of hardware and software, the Internet, and collaboration tools and technologies.

Information literacy is understanding the role of information in generating and using business intelligence.

Business intelligence (BI) provides historical, current, and predictive views of business operations and environments and gives organizations a competitive advantage in the marketplace.

Transaction-processing systems (TPS) focus on data collection and processing; the major reason for using them is cost reduction.

Information Technologies at Domino's Pizza

► FINANCE | TECHNOLOGY IN SOCIETY | APPLICATION | REFLECTIVE THINKING

In 1960, Domino's Pizza opened its first store. Today, there are nearly 15,000 stores, more than half of them outside the United States. In 2007, Domino's started online and mobile ordering. Today, customers can order online at www.dominos.com or they can use apps for the iPhone, Android, or Kindle Fire.¹⁷ This allows them to customize their pizzas with any combination of ingredients, enhancing their sense of participation while also saving Domino's the labor costs associated with phone orders. After placing the order, the customer can track it all the way to when it is sent out for delivery, keeping an eye on an estimated delivery time.

In 2012, Domino's surpassed \$1 billion in annual sales through its Web site, proving that electronic sales will continue to play a large role in the company's success.¹⁸

At Domino's, online ordering seamlessly accomplishes multiple objectives without the customer even taking notice. First, it creates the feeling among customers that they are an active part of the pizza-making process. Second, it results in greater efficiency at the various stores because employees do not have to spend as much time taking orders. They merely need to prepare the orders, which appear in an instant order queue, with all the customers' specifications.

Domino's now has the ability to store its online orders in its database. This data can then be used for many purposes, including target marketing and deciding which pizzas to offer in the future. The company is also actively using social media, including Facebook and Twitter, to promote its products and gather customers' opinions.

In 2014, Domino's began allowing customers to order pizza using a voice app called "Dom," powered by Nuance Communications. It enables users of iOS and Android devices to place orders using their voices.

Twitter is now a part of the ordering system at Domino's. As of 2015, U.S. customers can order pizza by tweeting a pizza emoji.¹⁹

Starting in 2016 customers were able to order Domino's Pizza from a Facebook Messenger bot.²⁰ Also in 2016, Domino's began testing a delivery robot called DRU in New Zealand.²¹ And the pizza company also announced plans to beat Amazon and Google to delivery by drones.²²

In 2017, Domino's tested self-driving pizza delivery in a joint project with Ford in a specially equipped Ford Fusion that comes with both self-driving technology and an oven.²³

In 2018, Domino's started pizza delivery to more than 150,000 "hot spots" nationwide, allowing customers to order pizza delivery to beaches, sports arenas, parks, and other locations that don't have a residential address.²⁴ In 2019 Domino's designed an app so that customers can order and receive pizza in their cars,²⁵ allowing IT to further expand its customer reach and its market share.



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Questions and Discussions

1. What are two advantages of online ordering in a fast-food restaurant such as Domino's Pizza?
2. What are four examples of information technology tools being used at Domino's Pizza? What are they used for?

However, there are some security risks associated with using ATMs. ATM skimming is a worldwide problem costing more than \$2 billion a year in fraudulent charges. Skimmers, by using a card the size of a credit card installed inside the ATM or on the top of the machine, are able to record PIN numbers and other financial information of the users. This could happen when you swiped your card at the ATM or even at a gas station. Skimmers have been stealing financial information from cards with magnetic strips, as chip-based cards

are more difficult to steal from. To protect your financial information while using an ATM, follow these steps²⁶:

- Check your bank statements regularly. Usually, if you report fraudulent charges within two days your bank will reimburse you for anything over \$50.
- Watch for signs that the ATM of a gas pump may have been tampered with. This could be done by physically touching the machine or checking on Bluetooth for unusual Wi-Fi networks.
- Cover your PIN number when entering it.

In recent years, it has been reported that some ATM machines have fallen victim to a technique used by computer criminals call *jackpotting* where machines are forced to spit out cash. Although the number of victims and how much money had been lost are not clear because victims and police often do not disclose details, banking officials should be aware of these criminal activities and guard against them.²⁷

1-4 MANAGEMENT INFORMATION SYSTEMS

A **management information system (MIS)** is an organized integration of hardware and software technologies, data, processes, and human elements designed to produce timely, integrated, relevant, accurate, and useful information for decision-making purposes.

The hardware components, which are discussed in more detail in Module 2, include input, output, and memory devices and vary depending on the application and the organization. MIS software, also covered in Module 2, can include commercial programs, software developed in-house, or both. The application or organization determines the type of software used. Processes are usually methods for performing a task in an MIS application. The human element includes users, programmers, systems analysts, and other technical personnel. This book emphasizes users of MISs.

If an organization has defined its strategic goals, objectives, and critical success factors, then structuring the data component to define what type of data is collected and in what form is usually easy.

In designing an MIS, the first task is to clearly define the system's objectives. Second, data must be collected and analyzed. Finally, information must be provided in a useful format for decision-making purposes.

Many MIS applications are used in both the private and public sectors. For example, an MIS for inventory control provides data (such as how much of each product is on hand), what items have been ordered, and what items are back-ordered. Another MIS might

forecast sales volume for the next fiscal period. This type of system uses recent historical data and mathematical or statistical models to generate the most accurate forecast, and sales managers can use this information for planning purposes. In the public sector, an MIS for a police department, for example, could provide information such as crime statistics, crime forecasts, and allocation of police units. Management can examine these statistics to spot increases and decreases in crime rates or types of crimes and analyze this data to determine future deployment of law enforcement personnel.

As you will see in this book, many organizations use information systems to gain a competitive advantage. The information box on Domino's Pizza describes one example of this. (*Note:* MISs are often referred to as just *information systems*, and these terms are used interchangeably in this book.)

A management information system (MIS) is an organized integration of hardware and software technologies, data, processes, and human elements designed to produce timely, integrated, relevant, accurate, and useful information for decision-making purposes.

Data consists of raw facts and is a component of an information system.

1-5 MAJOR COMPONENTS OF AN INFORMATION SYSTEM

In addition to hardware, software, and human elements, an information system includes four major components, which are discussed in the following sections: data, a database, a process, and information (see Exhibit 1.3).²⁸

1-5a Data

The **data** component of an information system is considered the input to the system. The information that users need affects the type of data that is collected and used. Generally, there are two sources of data: external and internal. An information system should collect data from

Exhibit 1.3

Major components of an information system

