INTERNATIONAL EDITION

Management Information Systems



www.prenhall.com/mcless

Raymond McLeod, Jr. George P. Schell



Preface xxi

PART I ESSENTIAL CONCEPTS 1

	COCHAND CONOCI IO
Chapter 1	Introduction to Information Systems 2
	History Of Information Systems 4
	The Evolution in Computer Hardware 4
	Smaller Computers 5
	Moore's Law 6
	Introduction to Computer Architecture 7

Introduction to Communications Architecture 8

The Evolution in Computer Applications 8

Transaction Processing Systems 9

Management Information Systems 9

Virtual Office Systems 12

Decision Support Systems 12

Enterprise Resource Planning Systems 13

Putting the Evolution in Computer Applications in Perspective 14

Information System Users 14

Managers as Information System Users 14

Where Managers Are Found 14

What Managers Do 16

The Role of Information in Management Problem Solving 16

Problem Solving and Decision Making 16

Problem-Solving Phases 17

The Future of Information Technology 18

Highlights in MIS — The World's Smallest Logic Circuit 19

SUMMARY 19 KEY TERMS 20 KEY CONCEPTS 20 QUESTIONS 20 TOPICS FOR DISCUSSION 21 PROBLEMS 21 NOTES 22

Case Problem — Freeway Ford 21

Chapter 2	Information Systems for Competitive Advantage 24
	The Firm And Its Environment 25
	The General Systems Model of the Firm 25
	The Firm in Its Environment 26
	Environmental Resource Flows 27
	Competitive Advantage 28
	Porter's Value Chains 28
	The Dimensions of Competitive Advantage 29
	Challenges from Global Competitors 31
	The Special Need for Information Processing in an MNC 31
	The Special Need for Coordination in an MNC 31
	The Advantages of Coordination 32
	Information Management 32
	The Dimensions of Information 32
	The Changing Nature of Information Management 33
	Strategic Planning for Information Resources 34
	The Chief Information Officer 35
	Strategic Planning for the Enterprise 35
	Strategic Planning for Business Areas 35
	The SPIR Approach 35
	Core Content of a Strategic Plan for Information Resources 36
	An Example Strategic Plan for Information Resources 36
	Global Business Strategies 37
	Decentralized Control Strategy 39
	Centralized Control Strategy 40
	Centralized Expertise Strategy 40
	Centralized Control and Distributed Expertise Strategy 41
	Highlights in MIS — 9/11—Not the End of Globalization 43
	SUMMARY 42 KEY TERMS 43 KEY CONCEPTS 44
	QUESTIONS 44 TOPICS FOR DISCUSSION 44
	PROBLEMS 45 NOTES 46
	Case Problem — Water Equipment Technology Company of Mexico 45
Chapter 3	Using Information Technology to Engage in Electronic

Commerce 48

Electronic Commerce 49

Electronic Commerce Beyond the Boundary of the Firm 50

Anticipated Benefits from Electronic Commerce 51

Electronic Commerce Constraints 51

Scope of Electronic Commerce 52

The Path to Electronic Commerce 53

Business Intelligence 53

External Databases 53

Search Engines 54

Electronic Commerce Strategy and Interorganizational

Systems 55

The Interorganizational System (IOS) 55

IOS Benefits 55

Electronic Data Interchange (EDI) 56

Extranet 57

Electronic Funds Transfer (EFT) 57

Proactive and Reactive Business Partners 57

Adoption Influences 57

Indirect IOS Benefits 58

A Challenge to EDI 59

Business-To-Customer Strategies For Electronic Commerce 60

Digital Products 61

Physical Products 61

Virtual versus Hybrid Sales 61

Evolution of the Internet 63

ARPANET 63

The World Wide Web 64

Cyberspace and the Information Superhighway 65

Internet Standards 66

Business Applications of the Internet 66

Marketing Research 67

Retailing Applications 67

Suggestions for Successful Internet Use 68

Future Impact of The Internet on Business 68

Highlights in MIS — Get Your Red Hot Web Domain Here 66

SUMMARY 69 KEY TERMS 70 KEY CONCEPTS 70

QUESTIONS 70 TOPICS FOR DISCUSSION 71 PROBLEMS 71

NOTES 73

Case Problem - A Buck More 71

Chapter 4 System Users and Developers 74

The Business Organization 75

Office Automation 76

A Shift from Clerical to Managerial Problem Solving 77

The Virtual Office 77

Telecommuting 78

Advantages of Telecommuting to Employees 78

Disadvantages of Telecommuting to Employees 78

The Decreasing Role of Telecommuting 78

Hoteling 79

Advantages of the Virtual Office 80

Disadvantages of the Virtual Office 80

The Virtual Organization 80

The Societal Impact of the Virtual Organization 81

The Information Services Organization 81

The Information Resources 81

The Information Specialists 81

The Information Services Organizational Structure 82

Innovative Organizational Structures 82

End-User Computing 86

Users As an Information Resource 88

Benefits of End-User Computing 88

Risks of End-User Computing 89

Systems Development Knowledge and Skill 89

Systems Development Knowledge 89

Systems Development Skill 90

Knowledge Management 90

KM Challenges 91

A Successful KM Development Project at Nortel Networks 92

Challenges in Developing Global Information Systems 94

Politically Imposed Constraints 94

Cultural and Communications Barriers 94

Technological Problems 94

Lack of Support from Subsidiary Managers 94

Putting The System Users And Information Specialists in Perspective 95

Highlights in MIS - Video Conferencing Alternatives 79

SUMMARY 95 KEY TERMS 96 KEY CONCEPTS 96 QUESTIONS 97 TOPICS FOR DISCUSSION 97 PROBLEMS 97 NOTES 98

Case Problem - Cyber U 98

PART II INFORMATION RESOURCES 99

Chapter 5 Computing and Communications Resources 100

Hardware 101

Processors 101

Memory 103

Storage 104

Input Devices 106

Output Devices 108

Multimedia 109

Personal Computing Devices 109

Tablets, Handheld, and Pocket PCs 110

Personal Digital Assistants 111

Cell Phones with Interactive Messaging 112

Software 112

System Software 112

Application Software 113

The Role of User Friendly Software 114

Communications—Public Telephone System 114

Public Connections 114

Private Lines 116

Virtual Private Network 116

Communications—Networks 118

Protocols for Computer Communication 118

Packets 120

Internet Network Addresses 120

Network Types 120

Local Area Networks 121

Metropolitan Area Networks and Wide Area Networks 122

Internet 122

Convergence of Computing and Communications 123

Highlights in MIS — Blue Gene 103

Highlights in MIS — The Impact of Wireless Networks—Convenient

but Vulnerable 117

SUMMARY 124 KEY TERMS 125 KEY CONCEPTS 125

QUESTIONS 125 TOPICS FOR DISCUSSION 125

PROBLEMS 126 NOTES 127

Case Problem — Special Salmon 126

Chapter 6 Database Management Systems 128

Data Organization 129

The Data Hierarchy 129

The Spreadsheet As a Simple Database 130

Flat Files 130

Key Fields 131

Relating Tables 132

Database Structures 134

Hierarchical Database Structures 134

Network Database Structures 135

Relational Database Structures 135

A Relational Database Example 136

The Schedule Database 136

The Database Concept 139

Creating a Database 140

Determine the Data Needs 140

Data Modeling Techniques 141

Entity-Relationship Diagrams 141

Class Diagrams 143

Using the Database 144

Reports and Forms 145

Query-by-Example 148

Structured Query Language 148

Advanced Database Processing 149

Managing the Database 150

Resources 150

Database Personnel 150

Database Management Systems In Perspective 152

DBMS Advantages 152

DBMS Disadvantages 152

Highlights in MIS — It Can Be Healthy to Mine the Corporate Database 149

SUMMARY 153 KEY TERMS 153 KEY CONCEPTS 154

QUESTIONS 154 TOPICS FOR DISCUSSION 154

PROBLEMS 154 NOTES 155

Case Problem - Maple Tree Industries 155

Chapter 7 Systems Development 156

The Systems Approach 157

A Series of Steps 158

Preparation Effort 158

Definition Effort 159

Solution Effort 161

The Systems Development Life Cycle 162

The Traditional SDLC 162

Prototyping 163

Types of Prototypes 163

The Attraction of Prototyping 165

Potential Pitfalls of Prototyping 165

Rapid Application Development 165

The Essential Ingredients of RAD 166

Phased Development 166

The Phased Development Stages 167

Module Phases 168

Business Process Redesign 168

Reverse Engineering 168

Restructuring 170

Reengineering 170

Selection of the BPR Components 170

Putting The Traditional SDLC, Prototyping, RAD, Phased

Development, and BPR in Perspective 170

Process Modeling 171

Data Flow Diagrams 171

Use Cases 174

Use Case Guidelines 175

When to Use Data Flow Diagrams and Use Cases 175

Project Management 175

The MIS Steering Committee 176

Project Leadership 178

The Project Management Mechanism 178

Highlights in MIS — A Quick Fix for IT at the FBI? Think Again 178

SUMMARY 180 KEY TERMS 181 KEY CONCEPTS 181

QUESTIONS 181 TOPICS FOR DISCUSSION 182

PROBLEMS 182 NOTES 183

Case Problem — A Snow Job 182

Chapter 8 Information in Action 184

The Transaction Processing System 185

System Overview 186

The Major Subsystems of the Distribution System 187

Systems that Fill Customer Orders 187

Systems that Order Replenishment Stock 189

Systems that Perform General Ledger Processes 189

Putting the Transaction Processing System in Perspective 190

Organizational Information Systems 190

The Marketing Information System 190

The Human Resources Information System 191

The Executive Information System 191

Customer Relationship Management 193

Data Warehousing 195

Data Warehouse Characteristics 195

The Data Warehousing System 195

How Data Is Stored in the Warehouse Data Repository 196

Information Delivery 199

OLAP 200

Data mining 201

Hypothesis Verification 201

Knowledge Discovery 203

Putting Data Warehousing in Perspective 203

Highlights in MIS — Casinos Lead the Way in Data Mining 203

SUMMARY 204 KEY TERMS 205 KEY CONCEPTS 205

QUESTIONS 205 TOPICS FOR DISCUSSION 205

PROBLEMS 206 NOTES 206

Case Problem — The Data Mine 206

PART III MANAGING INFORMATION AND TECHNOLOGY 207

Chapter 9 Information Security 208

Information Security 209

Objectives of Information Security 209

Management of Information Security 210

Information Security Management (ISM) 210

Threats 210

Internal and External Threats 211

Accidental and Deliberate 212

Risks 212

Unauthorized Disclosure and Theft 212

Unauthorized Use 212

Unauthorized Destruction and Denial of Service 213

Unauthorized Modification 213

The Most Notorious Threat—The "Virus" 213

E-Commerce Considerations 213

The American Express "Disposable" Credit Card 213

Visa's Required Security Practices 213

Risk management 214

Information security policy 215

Controls 216

Technical Controls 216

Access Controls 217

Intrusion Detection Systems 218

Firewalls 218

Cryptographic Controls 219

Physical Controls 219

Putting the Technical Controls in Perspective 219

Formal Controls 219

Informal Controls 219

Achieving The Proper Level of Controls 220

Government and Industry Assistance 220

Government Legislation 220

Industry Standards 221

Professional Certification 221

Information Systems Audit and Control Association (ISACA) 221

International Information System Security Certification

Consortium (ISC) 222

SANS Institute 222

Putting Information Security Management

In Perspective 222

Business Continuity Management (BCM) 222

The Emergency Plan 222

The Backup Plan 222

The Vital Records Plan 223

Putting Business Continuity Management In Perspective 223

Highlights in MIS — Recovering from 9/11 and Enron 223

SUMMARY 224 KEY TERMS 225 KEY CONCEPTS 225

QUESTIONS 225 TOPICS FOR DISCUSSION 226

PROBLEMS 226 NOTES 227

Case Problem — Confidential Reports 226

Chapter 10 Ethical Implications of Information Technology 228

Prescriptive Versus Descriptive Coverage 229

Morals, Ethics, and Laws 230

Morals 230

Ethics 230

Laws 230

Computer Legislation in the United States 230

Software Patents 231

Software Patent Legislation in the European Union 231

Personal Privacy Legislation in the People's Republic of China 232

Putting Morals, Ethics, and Laws in Perspective 232

Need for an Ethics Culture 232

How the Ethical Culture Is Imposed 232

Putting the Credos, Programs, and Codes in Perspective 234

Reasons for a Computer Ethic 234

Reasons for the Importance of Computer Ethics 234

Social Rights and the Computer 235

Right to Privacy 235

Right to Accuracy 235

Right to Property 236

Right to Access 236

Information Auditing 236

The Importance of Objectivity 236

Types of Auditing Activity 237

The Internal Auditor as a Member of the Development Team 238

The Internal Audit Subsystem 238

Achieving Ethics in Information Technology 239

Codes of Ethics 239

Computer Ethics Education 241

Ethics and the CIO 242

 $\frac{1}{243}$

SUMMARY 244 KEY TERMS 245 KEY CONCEPTS 245

QUESTIONS 245 TOPICS FOR DISCUSSION 245

PROBLEMS 246 NOTES 247

Case Problem — Need to Know 246

Chapter 11 Decision Support Systems 248

What It's All About—Decision Making 249

Problem Solving and Decision Making 249

Problem-Solving Phases 249

Problem-Solving Frameworks 250

The Systems Approach 250

The Importance of a Systems View 250

Building on the Concepts 250

Elements of a Problem-Solving Process 250

Selecting the Best Solution 251

Problems versus Symptoms 252

Problem Structure 252

Types of Decisions 252

The DSS Concept 253

A DSS Model 254

Mathematical Modeling 255

Types of Models 255

Uses of Models 256

Classes of Mathematical Models 256

Simulation 257

Simulation Technique 258

Format of Simulation Output 258

A Modeling Example 258

Model Input 258

Model Output 258

Modeling Advantages and Disadvantages 259

Mathematical Modeling Using The Electronic Spreadsheet 261

Static Modeling Capability 261

Dynamic Modeling Capability 261

Playing the "What-if" Game 262

The Spreadsheet Model Interface 263

Artificial Intelligence 263

History of Al 263

Areas of Al 263

The Appeal of Expert Systems 263

The Expert System Configuration 264

Group Decision Support Systems 265

The GDSS Concept 265

How the GDSS Contributes to Problem Solving 265

GDSS Environmental Settings 265

Putting The DSS in Perspective 266

Highlights in MIS — Fix It Before It Breaks 267

SUMMARY 267 KEY TERMS 268 KEY CONCEPTS 268

QUESTIONS 268 TOPICS FOR DISCUSSION 269

PROBLEMS 269 NOTES 271

Case Problem — Scanco 269

PART IV PROJECTS 273

Project 1 Technology Enhanced Presentations 274

Presentation Basics 275

Getting Started 275

Fonts, Size, and Colors 276

Linking 277

Actions 278

Assignment 281

Project 2 Web/HTML Project Using Microsoft Word 282

Example 283

Making the Word Document 284

Saving the Example 290

View the Web Page 290

Advantages and Disadvantages 291

Assignment 291

Project 3 Web/HTML Project Using Notepad 292

Example 293

Sections of an HTML Document 294

Making the Notepad Document 294

Saving the Example 298

View the Web Page 298

Advantages and Disadvantages 298 Assignment 299 Web/HTML Customer Satisfaction Form 300 Project 4 Example 301 Sections of the Example Form 302 Saving the Example 305 View the Web Page 305 Assignment 306 **Project 5** Web/HTML Computer Purchase Form 308 Example 309 Sections of the Example Form 310 Saving the Example 313 View the Web Page 313 Assignment 314 Project 6 Spreadsheet Basics 316 Example 317 Discount Datasheet 318 Invoice Datasheet 319 Saving The Example 321 Assignment 321 Project 7 Spreadsheets with Data Capture—Minivan Example 322 Example 323 Options Datasheet 324 Car Datasheet 325 Calculating Values Based on Choices 328 Calculating Monthly Payments 328 Showing the Profit 328 Saving and Editing the Example 330 Assignment 331 **Project 8** Spreadsheets with Data Capture—College Computing Example 332 Example 333

Prices Datasheet 334

Computers Datasheet 334

Calculating Values Based on Choices 338 Choosing the Best Buy 339 Saving and Editing the Example 340 Assignment 342 Database Forms and Reports 344 Example 345 Textbook Database 345 Creating a Form 346 One Table Report 351 Report from Multiple Tables 354 Assignment 357 Database Queries—Textbook Database 358 Example 359 Textbook Database 360 Creating a Query with Constraints 361 Parameter Query 364 Inexact Constraints 365 Queries Requiring More Than One Table 366 Data Field Concatenation and Calculation 369 Assignment 373 Database Queries—ClassProjects Database 374 Example 375 ClassProjects Database 376 Creating a Query with Constraints 377 Parameter Query 380 Inexact Constraints 381 Queries Requiring More Than One Table 381 Data Field Concatenation and Calculation 385 Assignment 388 Reports Based on Queries 390 Example 391 Textbook Database 392 Creating a Query and Report to Show Books Required

Project 9

Project 10

Project 11

Project 12

for Classes 393

Creating the Query for Books 393

Creating the Report of Books Required for Classes 396

Creating a Report from a Parameter Query 398

Creating the Parameter Query 399

Creating the Report Based on the Parameter Query 400

Assignment 401

Glossary 403

References 409

Index 413