Fundamental of Web Programming

MDN Curriculum (Topics: 86)

	MDN Curriculum
	Module-01: Getting Started
	Soft Skills
01	Constant Learning Mindset
02	Open to Embracing Failure
03	Effective Research
04	Collaboration and Teamwork
05	Succeeding in Job Interviews
06	Workflows and Processes
07	Relevant Contextual Information
	Environment Setup
08	Computer Basics
09	File Systems
10	Browsing the Web
11	Command Line Basics
12	Code Editors
	MDN Curriculum
	Module-02: Core
	Web Standards
13	How the Web Works
14	The HTML, CSS, and JavaScript Triangle
15	The Web Standards Model
16	How Browsers Load Webpages
	Semantic HTML
17	Basic HTML Syntax
18	Good Document Structure
19	Lists
20	Advanced Text Techniques
21	Links
22	Media
23	Other Interactive Elements
24	HTML Tables
25	Debugging HTML
	CSS Fundamentals
26	Basic CSS Syntax
27	Selectors
28	The Box Model
29	Handling Conflicts in CSS
30	Values and Units
31	Sizing
32	Backgrounds and Borders
33	Overflow
34	Styling Form Elements
35	Debugging CSS
	CSS Text Styling
36	Text and Font Styling

37	Styling Lists and Links
38	Web Fonts
	CSS Layout
39	CSS Layout Basics
40	Floats
41	Positioning
42	Modern Layout
43	Responsive Design
	JavaScript Fundamentals
44	Variables
45	Math
46	Text
47	Arrays
48	Conditionals
49	Loops
50	Functions
51	JavaScript Object Basics
52	DOM Scripting
53	Events
54	Async JavaScript Basics
55	Network Requests with (fetch())
56	Working with JSON
57	Libraries and Frameworks
58	Debugging JavaScript
	Accessibility
59	Accessibility Basics
60	Accessible Styling
61	Accessible JavaScript
62	Assistive Technology
63	WAI-ARIA
	Design for Developers
64	Basic Design Theory
65	User-Centered Design
66	Design Briefs
67	**Version Control**
	Module-03: Extensions
68	**Transform and Animate CSS**
69	**Custom JS Objects**
	Web APIs
70	Video and Audio APIs
71	Graphics / Animation APIs
72	Client-Side Storage
	Performance
73	Performance Basics
74	Improving Page Rendering
75	Measuring Performance
76	CSS and Performance
77	JavaScript and Performance
	Security and Privacy
78	Security and Privacy Basics
79	Data Protection Laws

	Testing
80	General Testing Fundamentals
81	Functional and Compact Testing
82	Usability Testing
83	**JavaScript Frameworks**
	CSS Tooling
84	CSS Frameworks
85	CSS Preprocessors
86	**Other Tooling Types**

MDN Getting Stared Modules (Topics: 92)

	Getting Started Modules
	Learn Web Development
01	The Essential Skillset for New Front-End Developers
02	About Learn Web Development
03	Don’t Know Where to Get Stated?
04	Getting Our Code Examples
05	Contact Us
06	See Also
	Getting Started Modules
07	Prerequisites
08	Modules
09	Environment Setup
10	Your First Website
11	Web Standards
12	Soft Skills
	Module-01: Environment Setup
	Installing Basic Software
13	Overview: Environment Setup
14	Installing a Code Editor
15	Installing Modern Web Browsers
16	Installing a Local Web Server
17	What Tools Do The Professionals Use?
	Browsing The Web
18	How the Web Works: The Basics
19	The Difference Between Web Page, Website, Web Server, and Search Engine
20	Searching for Information
	Code Editors
21	What Code Editors are Available?
22	Basic Code Editor Functionality
23	Enhancing Your Code Editor with Extensions
	Dealing with Files
24	Where Should Your Website Live on Your Computer?
25	An Aside on Casing and Spacing
26	What Structure Should a Website Have?
27	File Paths
	Command Line Crash Course
28	Welcome to The Terminal
29	Basic Built-in Terminal Commands
30	Terminal – Considered Harmful?
31	Connecting Commands Together with Pipes
32	A Slightly More Complex Example
33	Adding Powerups
34	Other Tools to Play with
	Module-02: Your First Website
	What will Your Website Look Like?
35	First Things First: Planning
36	Sketching Out Your Design
37	Choosing a Theme Color

38	Choosing an Image
39	Choosing a Font
	HTML: Creating the Content
40	So What is HTML?
41	Creating Your First HTML Document
42	Images
43	Marking up Text
44	Links
45	Conclusion
	CSS: Styling the Content
46	What is CSS?
47	Fonts and Text
48	CSS: All About Boxes
49	Conclusion
	JavaScript: Adding Interactivity
50	What is JavaScript?
51	A “Hello World!” Example
52	Language Basics Crash Course
53	Supercharging Our Example Website
54	Conclusion
	Publishing Your Website
55	What are the Options?
56	Publishing via GitHub
57	Further Reading
	Module-03: Web Standards
	How the Web Works
58	Clients and Servers
59	The Other Parts of the Toolbox
60	So What Happens, Exactly?
61	Other in Which Component Files are Parsed
62	DNS Explained
63	Packets Explained
64	See Also
	The Web Standards Model
65	Brief History of the Web
66	Web Standards
67	Standards Bodies
68	The Web Standards Lifecycle
69	Overview of Modern Web Technologies
70	Web Best Practices
71	See Also
	How Browsers Load Websites
72	The Different Types of File Returned in an HTTP Response
73	Static Versus Dynamic Files
74	How Files are Assembled to Render a Web Document in the Browser
75	The Browser: Hostile Versus Awesome Programming Environment
	Module-04: Soft Skills
	Research and Learning
76	Effective Research
77	Constant Learning Mindset
78	See Also

	Collaboration and Teamwork
79	Getting on with Others
80	Participate, Help People, Ask Questions
81	Learn to Embrace Failure
	Workflows and Processes
82	Typical Technology Combinations and Application Architectures
83	Typical Processes for a Technical Project
84	Typical Job Roles
85	Common Work Management
86	See Also
	Succeeding in Job Interviews
87	Effective Strategies for Job Searching
88	Developing Qualities for That Employers Look for
89	Finding Work Experience
90	Selling Yourself to Would-be Employers
91	Preparing Yourself for Job Interviews
92	See Also

MDN Core Modules (Topics: 11)

	Core Modules
01	Prerequisites
02	Modules
03	Structuring Content with HTML
04	CSS Styling Basics
05	CSS Text Styling
06	CSS Layout
07	Dynamic Scripting with JavaScript
08	JavaScript Frameworks and Libraries
09	Accessibility
10	Design for Developers
11	Version Control

MDN Core Modules: Design (Topics: 05)

	Core Modules
	Module-07: Design for Developers
01	Prerequisites
02	Basic Design Theory
03	User-Centered Design
04	Design Briefs
05	See Also

MDN Extension Modules (Topics: 12)

	Extension Modules
01	Prerequisites
02	Modules
03	- Advanced JavaScript Objects
04	- Asynchronous JavaScript
05	- Web Forms
06	- Server-Side Website Programming
07	- Client-Side Web APIs
08	- Understanding Client-Side Web Development Tools
09	- Web Performance
10	- Testing
11	- Transform and Animation CSS
12	- Security and Privacy

MDN Reference

	Reference
	Web Technology for Developers
	Documentation for Web Developers
	Web Technology References
	Developer Tools Documentation
	References
	- Developer Guides
	- Tutorials
	References
	- HTML
	- CSS: Cascading Style Sheets
	- JavaScript
	References
	- MathML
	- Event Reference
	- SVG
	- XML: Extensible Markup Language
	- XPath
	- XSLT: Extensible Stylesheet Language Transformations
	- EXSLT
	References
	- Accessibility
	- Web Performance
	- HTTP
	References
	- URIs
	- OpenSearch Description Format
	- Privacy on The Web
	- Security on The Web
	- Progressive Web Apps
	- Web App Manifests
	- Web Media Technologies
	- WebDriver

Front-End Development

MDN Core Modules: HTML (Topics: 109)

	Core Modules
	Module-01: Structuring Content with HTML
	Basic HTML Syntax
01	What is HTML?
02	Anatomy of an HTML Element
03	Attributes
04	Anatomy of an HTML Document
05	Character References: Including Special Characters in HTLM
06	HTML Comments
07	Summary
08	See Also
	What's in the Head? Webpage Metadata
09	What is the HTML Head?
10	Adding a Title
11	Metadata: The <meta> Element
12	Adding Custom Icons to Your Site
13	Applying CSS and JavaScript to HTML
14	Setting the Primary Language of the Document
15	Summary
	Headings and Paragraphs in HTML
16	Headings and Paragraphs
17	Implementing Structural Hierarchy
18	Why do We Need Structure?
19	Active Learning: Giving Our Content Structure
20	Why Do We Need Semantics?
21	Summary
	Emphasis and Importance
22	What are Emphasis and Importance?
23	Active Learning: Let's Be Important
24	Italic, Bold, Underline …
25	Summary
	Lists
26	Unordered Lists
27	Ordered
28	Active Learning: Marking up Our Recipe Page
29	Nesting Lists
30	Description Lists
31	Test Your Skills
32	Summary
	Structuring Documents
33	Basic Sections of a Document
34	HTML for Structuring Content
35	HTML Layout Elements in More Detail
36	Planning a Simple Website
37	Summary
	Advanced Text Features
38	Quotations

39	Abbreviations
40	Marking up Contact Details
41	Superscript and Subscript
42	Representing Computer Code
43	Marking up Times and Dates
44	Test Your Skills
45	Summary
	Creating Links
46	What is a Hyperlink?
47	Anatomy of a Link
48	A Quick Primer on URLs and Paths
49	Link Best Practices
50	Active Learning: Creating a Navigation Menu
51	Email Links
52	Test Your Skills
53	Summary
	Challenge: Marking up a Letter
54	Starting Point
55	Project Brief
56	Hints and Tips
57	Example
	Challenge: Structuring a Page of Content
58	Starting Point
59	Project Brief
60	Hints and Tips
	HTML Images
61	How Do We Put an Image on a Webpage?
62	Media Assets and Licensing
63	Annotating Images with Figures and Figure Captions
64	CSS Background Images
65	Test Your Skills
66	Summary
	HTML Video and Audio
67	Video and Audio on the Web
68	The <Video> Element
69	Using Multiple Source Formats to Improve Compatibility
70	Other <video> Features
71	The <audio> Element
72	Displaying Video Text Tracks
73	Active Learning: Embedding Your Own Audio and Video
74	Test Your Skills
75	Summary
	Challenge: Mozilla Splash Page
76	Starting Point
77	Project Brief
78	Hints and Tips
79	Example
	HTML Table Basics
80	What is a Table?
81	Active Learning: Creating Your First Table
82	Adding Headers with <th> Elements

83	Allowing Cells to Span Multiple Rows and Columns
84	Summary
	HTML Table Accessibility
85	Recap: Tables for Visually Impaired Users
86	Adding a Caption to Your Table with <caption>
87	Adding Structure with <thead>, <tbody> and <tfoot>
88	The (Scope) Attribute
89	The (Id) and (headers) Attributes
90	Active Learning: Playing with (scope and headers)
91	Summary
	Challenge: Structuring a Planet Data Table
92	Starting Point
93	Project Brief
94	Hints and Tips
95	Example
	Forms and Buttons in HTML
96	Buttons
97	Common Input Types
98	Accessible Forms
99	Other Control Types
100	Client-Side Form Validation
101	The <form> Element
102	Test Your Skills
103	Summary
	Debugging HTML
104	Debugging Isn’t Scary
105	HTML and Debugging
106	Permissive Code
107	HTML Validation
108	Using a DOM Inspector
109	Summary

MDN Core Modules: CSS (Topics: 217)

	Core Modules
	Module-02: CSS Styling Basics
	What is CSS?
01	Browser Default Styles
02	What is CSS for?
03	CSS Syntax Basics
04	How is CSS Applied to HTML?
05	Summary
	Getting Started with CSS
06	Starting with Some HTML
07	Adding CSS to Our Document
08	Using Common Selectors
09	Other CSS Syntax Features
10	Summary
	Challenge: Styling a Biography Page
11	Project Brief
12	Hints and Tips
13	Example
	Basic CSS Selectors
14	What is a Selector?
15	Type Selectors
16	Class Selectors
17	ID Selectors
18	Selector Lists
19	The Universal Selector
20	Summary
	Attribute Selectors
21	Presence and Value Selectors
22	Substring Matching Selectors
23	Summary
	Pseudo-Classes and Pseudo-Element
24	What is a Pseudo-Class?
25	What is a Pseudo-Element?
26	Combining Pseudo-Classes and Pseudo-Elements
27	Generating Content with ::before and ::after
28	Summary
29	See Also
	Combinators
30	Descendant Combinator
31	Child Combinator
32	Next-Sibling Combinator
33	Subsequent-Sibling Combinator
34	Creating Complex Selectors with Nesting
35	Combining Combinators with Selectors
36	Test Your Skills
37	Summary
	The Box Model
38	Block and Inline Boxes

39	Inner and Outer Display Types
40	Examples of Different Display Types
41	What is the CSS Box Model?
42	Playing with Box Models
43	Margins, Padding, and Borders
44	The Box Model and Inline Boxes
45	Using Display: Inline-Block
46	Test Your Skills
47	Summary
	Handling Conflicts
48	Conflicting Rules
49	Understanding Inheritance
50	Understanding the Cascade
51	The Effect of CSS Location
52	Test Your Skills
53	Summary
	CSS Values and Units
54	What is a CSS Value?
55	Numbers, Lengths, and Percentages
56	Color
57	Images
58	Position
59	Strings and Identifiers
60	Functions
61	Test Your Skills
62	Summary
	Sizing Items in CSS
63	The Natural or Intrinsic Size of Things
64	Setting a Specific Size
65	min- and max- sizes
66	Viewport units
67	Test Your Skills
68	Summary
	Backgrounds and Borders
69	Styling Backgrounds in CSS
70	Background Colors
71	Background Images
72	Gradient Backgrounds
73	Multiple Background Images
74	Background Attachment
75	Using the Background Shorthand Property
76	Accessibility Considerations with Backgrounds
77	Borders
78	Rounded Corners
79	Test Your Skills
80	Summary
	Overflowing Content
81	What is Overflow?
82	CSS Tries to Avoid “Data Loss”
83	The Overflow Property
84	Unwanted Overflow in Web Design

85	Test Your Skills
86	Summary
	Images, Media, and Form Elements
87	Replaced Elements
88	Sizing Images
89	Replaced Elements in Layout
90	Form Elements
91	Styling Text Input Elements
92	Normalizing Form Behavior
93	Test Your Skills
94	Summary
	Styling Tables
95	A Typical HTML Table
96	Getting Started with Styling Our Table
97	Spacing and Layout
98	Some Simple Typography
99	Graphics and Colors
100	Styling the Caption
101	Table Styling Quick Tips
102	Test Your Skills
103	Summary
	Debugging CSS
104	How to Access Browser DevTools
105	The DOM Versus View Source
106	Inspecting the Applied CSS
107	Editing Values
108	Adding a New Property
109	Understanding the Box Model
110	Solving Specificity Issues
111	Debugging Problems in CSS
112	Summary
113	See Also
	Challenge: Fundamental CSS Comprehension
114	Starting Point
115	Project Brief
116	Hints and Tips
117	Example
	Challenge: Creating Fancy Letter-Headed Paper
118	Starting Point
119	Project Brief
120	Hints and Tips
121	Example
	Challenge: A Cool-Looking Box
122	Starting Point
123	Project Brief
124	Hints and Tips
125	Example
	Module-03: CSS Text Styling
	Fundamental Text and Font Styling
126	What is Involved in Styling Text in CSS?
127	Fonts

128	Text Layout
129	Font Shorthand
130	Active Learning: Playing with Styling Text
131	Summary
132	See Also
	Styling Lists
133	A Simple List Example
134	Handling List Spacing
135	List-Specific Styles
136	Controlling List Counting
137	Active Learning: Styling a Nested List
138	Summary
	Styling Links
139	Link States
140	Default Styles
141	Styling Links
142	Active Learning: Style Your Own links
143	Including Icons on Links
144	Styling Links As Buttons
145	Summary
	Web Fonts
146	Font Families Recap
147	Web Fonts
148	Active Learning: A Web Font Example
149	Using an Online Font Service
150	@font-face in More Detail
151	Summary
152	See Also
	Challenge: Typesetting a Community School Homepage
153	Starting Point
154	Project Brief
155	Hints and Tips
156	Example
	Module-04: CSS Layout
	Introduction to CSS Layout
157	Normal Layout Flow
158	How are Elements Laid Out by Default?
159	Overriding Normal Flow
160	Summary
	Floats
161	The Background of Floats
162	A (float) Example
163	Clearing (floats)
164	Clearing Boxes Wrapped Around a (float)
165	Test Your Skills
166	Summary
	Positioning
167	Introducing Positioning
168	Static Positioning
169	Relative Positioning
170	Absolute Positioning

171	Fixed Positioning
172	Sticky Positioning
173	Test Your Skills
174	Summary
	Flexbox
175	Why Flexbox?
176	Introducing a Simple Example
177	Specifying What Elements to Lay Out As Flexible Boxes
178	The Flex Model
179	Columns or Rows?
180	Wrapping
181	(Flex-flow) Shorthand
182	Flexible Sizing of (flex) Items
183	Flex: Shorthand Versus Longhand
184	Horizontal and Vertical Alignment
185	Ordering (flex) Items
186	Nested (flex) Boxes
187	Test Your Skills
188	Summary
	CSS Grid Layout
189	What is Grid Layout?
190	Creating Your Grid in CSS
191	Line-Based Placement
192	Positioning with grid-template-areas
193	Nesting grids and subgrid
194	Grid Systems
195	Test Your Skills
196	Summary
197	See Also
	Responsive Design
198	Precursor to Responsive Design: Mobile Web Design
199	Introducing Responsive Web Design
200	Media Queries
201	Responsive Layout Technology
202	Responsive Images/Media
203	Responsive Typography
204	The (viewport) Meta Tag
205	Summary
206	See Also
	Media Query Fundamentals
207	Media Query Basics
208	More Complex Media Queries
209	How to Choose Breakpoints
210	Active Learning: Mobile First Responsive Design
211	The (viewport) Meta Tab
212	Do You Really Need a Media Query?
213	Test Your Skills
214	Summary
215	Challenge: Fundamental Layout Comprehension
216	Starting Point
217	Project Brief | Hints and Tips | Examples

MDN Core Modules: JavaScript (Topics: 241)

	Core Modules
	Module-05: Dynamic Scripting with JavaScript
	What is JavaScript
01	A High-Level Definition
02	So What Can It Really Do?
03	What is JavaScript Doing On Your Page?
04	How Do You Add JavaScript to Your Page?
05	Comments
06	Summary
	A First Splash Into JavaScript
07	Thinking Like a Programmer
08	Example- Guess The Number Game
09	Summary
	What Went Wrong? Troubleshooting JavaScript
10	Types of Error
11	An Erroneous Example
12	Fixing Syntax Errors
13	A logic Error
14	Other Common Errors
15	See Also
	Storing The Information You Need – Variables
16	Tools You Need
17	What is a Variable?
18	Declaring a Variable
19	Initializing a Variable
20	A Note About (var)
21	Updating a Variable
22	Variable Types
23	Dynamic Typing
24	Constants in JavaScript
25	When to Use (const) and When to Use (let)
26	Test Your Skills
27	Summary
	Basic Math in JavaScript – Numbers and Operators
28	Everybody Loves Math
29	Arithmetic Operators
30	Increment and Decrement Operators
31	Assignment Operators
32	Active Learning: Sizing a Canvas Box
33	Comparison Operators
34	Test Your Skills
35	Summary
	Handling Text – Strings in JavaScript
36	The Poser of Words
37	Declaring Strings
38	Embedding JavaScript
39	Multiline Strings
40	Including Quotes in Strings

41	Numbers vs. Strings
42	Summary
	Useful String Methods
43	Strings as Objects
44	Finding the Length of a String
45	Retrieving a Specific String Character
46	Testing if a String Contains a Substring
47	Finding the Position of a Substring in a String
48	Extracting a Substring from a String
49	Changing Case
50	Updating Parts of a String
51	Active Learning Examples
52	Test Your Skills
53	Conclusion
	Arrays
54	What is an Array?
55	Creating Arrays
56	Finding the Length of an Array
57	Accessing and Modifying Array Items
58	Finding the Index of Items in an Array
59	Adding Items
60	Removing Items
61	Accessing Every Item
62	Converting Between Strings and Arrays
63	Active Learning: Printing Those Products
64	Active Learning: Top 5 Searches
65	Test Your Skills
66	Conclusion
	Challenge: Silly Story Generator
67	Starting Point
68	Project Brief
69	Steps to Complete
70	Hints and Tips
	Making Decisions in Your Code – Conditionals
71	You Can Have It On One Condition
72	If…else Statements
73	Switch Statements
74	Ternary Operator
75	Active Learning: A Simple Calendar
76	Active Learning: More Color Choices
77	Test Your Skills
78	Summary
79	See Also
	Looping Code
80	Why are Loops Useful?
81	Looping Through a Collection
82	The Standard (for) Loop
83	Exiting Loops with (break)
84	Skipping Iterations with Continue
85	(while) and (do…while)
86	Active Learning: Launch Countdown

87	Active Learning: Filling in a Guest List
88	Which Loop Type Should You Use?
89	Test Your Skills
90	Summary
91	See Also
	Functions – Reusable Blocks of Code
92	Where Do I Find Functions?
93	Built-in Browser Functions
94	Functions Versus Methods
95	Invoking Functions
96	Function Parameters
97	Anonymous Functions and Arrow Functions
98	Function Scope and Conflicts
99	Test Your Skills
100	Summary
101	See Also
	Build Your Own Function
102	Active Learning: Let's Build a Function
103	The Basic Function
104	Calling the Function
105	Improving the Function with Parameters
106	Test Your Skills
107	Summary
	Function Return Values
108	What are Return Values?
109	Using Return Values in Your Own Functions
110	Active Learning: A Return Value Function
111	Now It's Your Turn
112	Test Your Skills
113	Conclusion
114	See Also
	Introduction to Events
115	What is an Event?
116	Using addEventListener()
117	Other Event Listener Mechanisms
118	Event Objects
119	Preventing Default Behavior
120	It's Not Just Web Pages
121	Summary
	Event Bubbling
122	Introducing Event Bubbling
123	Event Capture
124	Event Delegation
125	(target) and (currrentTarget)
126	Test Your Skills
127	Summary
128	See Also
	Challenge: Image Gallery
129	Starting Point
130	Project Brief
131	Steps to Complete

132	Declare an Array of Image (filenames)
133	Hints and Tips
	JavaScript Object Basics
134	Object Basics
135	Dot Notation
136	Bracket Notation
137	Setting Object Members
138	What is “this”?
139	Introducing Constructors
140	You’ve Been Using Objects All Along
141	Test Your Skills
142	Summary
	DOM Scripting Introduction
143	The Important Parts of a Web Browser
144	The Document Object Model
145	Active Learning: Basic DOM Manipulation
146	Active Learning: A Dynamic Shopping List
147	Summary
148	See Also
	Making Network Requests with JavaScript
149	What is the Problem Here?
150	The Fetch API
151	The XMLHttpRequest API
152	Summary
153	See Also
	Working with JSON
154	No, Really, What is JSON?
155	Active Learning: working Through a JSON Example
156	Converting Between Object and Text
157	Test Your Skills
158	Summary
159	See Also
	Debugging JavaScript and Handling Errors
160	Recap on Types of JavaScript Error
161	Linting Your Code
162	Common JavaScript Problems
163	The Browser JavaScript Console
164	The Console API
165	Using the JavaScript Debugger
166	Handling JavaScript Error in Your Code
167	Finding Help
168	Summary
	Module-06: JavaScript Frameworks and Libraries
169	**Introduction to Client-Side Frameworks**
170	The Emergence of Libraries and Frameworks
171	What Frameworks are Out There?
172	Why Do Frameworks Exist?
173	The Verbosity of DOM Changes
174	Another Way to Build UIs
175	Other Things Frameworks Give Us
176	Things to Consider When Using Frameworks

177	Accessibility On a Framework-Driven Web
178	How to Choose a Framework
179	Alternatives to Client-Side Frameworks
180	Summary
	Framework Main Features
181	Domain-Specific Languages
182	Writing Components
183	Styling Components
184	Handling Dependencies
185	Rendering Elements
186	Routing
187	Testing
188	Summary
	Getting Started with React
189	Hello React
190	Use Cases
191	How Does React Use JavaScript?
192	Setting Up Your First React App
193	Exploring Our First React Component - <App />
194	Moving on to (main)
195	Starting (fresh)
196	Practice with (JSX)
197	Summary
198	See Also
	Beginning Our React To-do List
199	Our App's User Stories
200	Pre-Project Housekeeping
201	Project Starter Code
202	Summary
	Componentizing Our React App
203	Defining Our First Component
204	Make a <Todo />
205	Make a Unique <Todo />
206	So far, So Good?
207	Tasks as Data
208	Rendering with Iteration
209	Unique Keys
210	Componentizing the Rest of the App
211	Importing All Our Components
212	Summary
	React Interactivity: Events and State
213	Handling Events
214	Callback Props
215	Persisting and Changing Data with State
216	Putting It All Together: Adding a Task
217	Detour: Counting Tasks
218	Completing a Task
219	Deleting a Task
220	Deleting Tasks From State and UI
221	Summary
	React Interactivity: Editing, Filtering, Conditional Rendering

222	Editing the Name of a Task
223	A UI for Editing
224	Conditional Rendering
225	Toggling the <Todo /> templates
226	Editing from the UI
227	Back to the Filter Buttons
228	Summary
	Accessibility in React
229	Including Keyboard Users
230	Exploring the Keyboard Usability Problem
231	Focusing Between Templates
232	More Robust Focus Management
233	Focusing When the User Deletes a Task
234	Finished
	React Resources
235	Component-Level Styles
236	React DevTools
237	The (useReducer()) Hook
238	The Context API
239	Class components
240	Testing
241	Routing

Full-Stack Development

MDN Extension Modules: Advance JavaScript (Topics: 197)

	Extension Modules
	Module-01: Advanced JavaScript Objects
	Object Prototypes
01	The Prototype Chain
02	Shadowing Properties
03	Setting a Prototype
04	Prototypes and Inheritance
05	Summary
	Object-Oriented Programming
06	Classes and Instances
07	Inheritance
08	Encapsulation
09	OOP and JavaScript
10	Summary
	Classes in JavaScript
11	Classes and Constructors
12	Inheritance
13	Encapsulation
14	Test Your Skills
15	Summary
	Object Building Practice
16	Let's Bounce Some Balls
17	Getting Stared
18	Modeling a Ball in Our Program
19	Animation the Ball
20	Adding Collision Detection
21	Summary
22	See Also
	Challenge: Adding Features to Our Bouncing Balls Demo
23	Starting Point
24	Hints and Tips
25	Project Brief
26	Steps to Complete
	Module-02: Asynchronous JavaScript
	Introducing Asynchronous JavaScript
27	Synchronous Programming
28	A Long-Running Synchronous Function
29	The Trouble with Log-Running Synchronous Functions
30	Event Handlers
31	Callbacks
	Video and Audio APIs (Above)
	How to Use Promises
32	Using the (fetch()) API
33	Chaining Promises
34	Catching Errors
35	Promise Terminology
36	Combining Multiple Promises

37	(async) and (await)
38	Summary
39	See Also
	How to Implement a Promise-based API
40	Implementing an (alarm()) API
41	Using the (alarm()) API
42	Using (async) and (await) with the (alarm()) API
43	See Also
	Introducing Workers
44	Using Web Workers
45	Other Types of Workers
46	Summary
47	See Also
	Challenge: Sequencing Animations
48	Starting Point
49	Project Brief
50	Steps to Complete
	Module-03: Web Forms
	Your First Form
51	What are Web Forms?
52	Designing Your Form
53	Active Learning: Implementing Our Form HTML
54	Basic Form Styling
55	Sending Form Data to Your Web Server
56	Summary
	How to Structure a Web Form
57	The <form> Element
58	The <fieldset> and <legend> Elements
59	The <label> Element
60	Common HTML Structures Used with Forms
61	Test Your Skills
62	Summary
63	See Also
	Basic Native Form Controls
64	Text Input Fields
65	Checkable Items: Checkboxes and Radio Buttons
66	Actual Buttons
67	File Picker
68	Common Attributes
69	Test Your Skills
70	Summary
	The HTML5 Input Types
71	Email Address Field
72	Search Field
73	Phone Number Field
74	URL Field
75	Numeric Field
76	Slider Controls
77	Date and Time Pickers
78	Color Picker Control
79	Test Your Skills

80	Summary
	Other Form Controls
81	Multi-Line Text Fields
82	Drop-Down Controls
83	Other Form Features
84	Test Your Skills
85	Summary
	Styling Web Forms
86	Challenges in Styling Form Widgets
87	Styling Simple Form Widgets
88	A Specific Styling Example
89	Test Your Skills
90	Summary
	Advanced Form Styling
91	Appearance: Controlling OS-Level Styling
92	What Can Be Done About The “ugly” Elements?
93	Summary
	UI Pseudo-Classes
94	What Pseudo-Classes Do We Have Available?
95	Styling Inputs Based On Whether They are Required or Not
96	Using Generated Content with Pseudo-Classes
97	Styling Controls Based On Whether Their Data is Valid
98	Styling Enabled and Disabled Inputs, and Read-Only and Read-Write
99	Radio and Checkbox State – Checked, Default, Indeterminate
100	More Pseudo-Classes
101	Test Your Skills
102	Summary
	Client-Side Form Validation
103	What is Form Validation?
104	Different Types of Client-Side Validation
105	Using Build-in Form Validation
106	Built-in Form Validation Examples
107	Validating Form Using JavaScript
108	Test Your Skills
109	Summary
	Sending Form Data
110	Client/Server Architecture
111	On the Client Side: Defining How to Send the Data
112	On the Server Side: Retrieving the Data
113	A Special Case: Sending Files
114	Security Issues
115	Summary
116	See Also
	Module-04: Server-Side Websites
	Server-Side First Steps
	Introduction to the Server Side
117	What is Server-Side Website Programming?
118	Are Server-Side and Client-Side Programming ths Same?
119	What Can You Do On the Server-Side?
120	Summary
	Client-Server Overview

121	Web Servers and HTTP (A Primer)
122	Static Sites
123	Dynamic Sites
124	Web Frameworks Simplify Server-Side Web Programming
125	Summary
	Server-Side Web Frameworks
126	Overview
127	What Can A Web Framework Do for You?
128	How to Select A Web Framework
129	A Few Good Web Frameworks?
130	Summary
	Web Security
131	What is Website Security?
132	Website Security Threats
133	A Few Key Messages
134	Summary
	Express Web Framework (Node.JS)
	Express/Node Introduction
135	Introducing Node
136	Web Frameworks
137	Introducing Express
138	Where Did Node and Express Come From?
139	How Popular are Node and Express?
140	Is Express Opinionated?
141	What Does Express Code Look Like?
142	Summary
	Setting Up a Node Development Environment
143	Express Development Environment Overview
144	Installing Node
145	Using NPM
146	Installing the Express Application Generator
147	Summary
148	See Also
	Express Tutorial: The Local Library Website
149	Overview
150	The LocalLibrary Website
151	I'm stuck, Where Can I Get the Source?
152	Summary
	Express Tutorial Part-2: Creating a Skeleton Website
153	Overview
154	Using the Application Generator
155	Creating the Project
156	Running the Skeleton Website
157	Enable Server Restart on File Changes
158	The Generated Project
159	Challenge Yourself
160	Summary
161	See Also
	Express Tutorial Part-3: Using a Database (with Mongoose)
162	Overview
163	Designing the LocalLibrar Models

164	Mongoose Primer
165	Setting Up the MongoDB Database
166	Install Mongoose
167	Connect to MongoDB
168	Defining the LocalLibrary Schema
169	Testing – Create Some Items
170	Summary
171	See Also
	Express Tutorial Part-4: Routes and Controllers
172	Overview
173	Routes Primer
174	Routes Needed for the LocalLibrary
175	Create the Route-Handler Callback Functions
176	Create the Catalog Route Module
177	Summary
178	See Also
179	**Express Tutorial Part-5: Displaying Library Data**
180	Overview
181	Displaying Library Data Tutorial Sub-articles
182	Summary
183	See Also
	Express Tutorial Par-6: Working with Forms
184	Overview
185	Express Forms Sub-articles
186	Challenge Yourself
187	Summary
188	See Also
	Express Tutorial Part-7: Deploying to Production
189	Overview
190	What is a Production Environment?
191	Choosing a Hosting Provider
192	Getting Your Website Ready to Publish
193	Example: Hosting on Glitch
194	Example: Hosting on Railway
195	Summary
196	See Also
197	**Django Web Framework (Python)**

MDN Extension Modules: Advance Client-Side and Security (Topics: 64)

	Extension Modules
	Module-01: Client-Side Web APIs
	Introduction to Web APIs
01	What are APIs?
02	What Can APIs Do?
03	How Do APIs Work?
04	Summary
	Video and Audio APIs
05	HTML Video and Audio
06	The HTMLMediaElement API
07	Summary
08	See Also
	Drawing Graphics
09	Graphics on the Web
10	Active Learning: Getting Started with a <canvas>
11	2D Canvas Basics
12	Loops and Animations
13	WebGL
14	Summary
15	See Also
16	Example
	Client-Side Storage
17	Client-Side Storage?
18	Storing Simple Data – Web Storage
19	Storing Complex Data – IndexedDB
20	Offline Asset Storage
21	Summary
22	See Also
	Third-Party APIs
23	What are Third Party APIs?
24	Extending the MapQuest Example
25	A RESTful API – NYTimes
26	YouTube Example
27	Summary
	Module-02: Understanding Client-Side Tools
	Client-Side Tooling Overview
28	Overview of Modern Tooling
29	The Modern Tooling Ecosystem
30	How to Choose and Get Help with a Particular Tool
31	Summary
	Package Management Basics
32	A Dependency in Your Project
33	What Exactly is a Package Manager?
34	Package Registries
35	Using the Package Ecosystem
36	A Rough Guide to Package Manager Clients
37	Making Your Own Commands
38	Summary

39	See Also
	Introducing a complete Toolchain
40	Introducing Our Case Study
41	Tools Used in Our ToolChain
42	Toolchains and Their Inherent Complexity
43	Checking Prerequisites
44	Creating a Development Environment
45	Build and Transformation Tools
46	Write the Source Code
47	Running the Transformation
48	Summary
	Deploying Our App
49	Post Development
50	The Build Process
51	Committing Changes to GitHub
52	Using GitHub Actions for Deployment
53	Testing
54	Summary
	Module-03: Transform and Animation CSS
55	Prerequisites
56	Learning Outcomes
57	Guide
58	- Using CSS Transforms
59	- Using CSS Transitions
60	- Using CSS Animations
	Module-04: Security and Privacy
61	Prerequisites
62	Learning Outcomes
63	Resources
64	See Also

MDN Extension Modules (Topics: 142)

	Extension Modules
	Module-01: Version Control
01	Overview
02	Prerequisites
03	Learning Outcomes
04	Guides
05	Hello, World (from GitHub)
06	Git Handbook (from GitHub)
07	Forking Projects (from GitHub)
08	About Pull Requests (from GitHub)
09	Mastering Issues (from GitHub)
10	See Also
	Module-02: Accessibility
	What is Accessibility?
11	So What is Accessibility?
12	What Kinds of Disability are We Looking At?
13	Implementing Accessibility into Your Project
14	Accessibility Guidelines and the Law
15	Accessibility APIs
16	Summary
17	See Also
	Accessibility Tooling and Assistive Technology
18	Accessibility Tools
19	Screen Readers
20	User Testing
21	Other Tooling
22	Accessibility Testing checklist
23	Summary
	HTML: A Good Basics for Accessibility
24	HTML and Accessibility
25	Good Semantics
26	Accessible Data Tables
27	Text Alternatives
28	More on Links
29	Test Your Skills
30	Summary
	CSS and JavaScript Accessibility Best Practices
31	CSS and JavaScript are Accessible?
32	CSS
33	JavaScript
34	Test Your Skills
35	Summary
	WAI-ARIA Basics
36	What is WAI-ARIA?
37	Practical WAI-ARIA Implementations
38	Test Your Skills
39	Summary
	Accessible Multimedia

40	Multimedia and Accessibility
41	Simple Images
42	Accessible Audio and Video Controls
43	Audio Transcripts
44	Video Text Tracks
45	Summary
	Mobile Accessibility
46	Accessibility on Mobile Devices
47	Summary of Screen Reader Testing on Android and iOS
48	Control Mechanisms
49	Responsive Design
50	User Input
51	Summary
52	See Also
	Challenge: Accessibility Troubleshooting
53	Starting Point
54	Project Brief
	Module-03: Web Performance
	The "why" of Web Performance
55	Why Care About Performance?
56	Conclusion
	What is Web Performance?
57	What is Web Performance?
58	How Content is Rendered
59	Conclusion
	Perceived Performance
60	Overview
61	Performance Metrics
62	Improving Performance
63	Conclusion
	Measuring Performance
64	Performance Tools
65	General Performance Reporting Tools
66	Network Monitor Tools
67	Performance Monitor Tools
68	Performance APIs
69	Conclusion
	Multimedia: Images
70	Why Optimize Your Multimedia?
71	Optimizing Image Delivery
72	Conclusion
	Multimedia: Video
73	Why Optimize Your Multimedia?
74	Optimizing Video Delivery
75	Conclusion
	JavaScript Performance Optimization
76	To Optimize or Not to Optimize
77	Optimizing JavaScript Downloads
78	Handling Parsing and Execution
79	Loading Critical Assets As Soon As Possible
80	Deferring Execution of Non-Critical JavaScript

81	Breaking Down Long Tasks
82	Handling JavaScript Animations
83	Optimizing Event Performance
84	Tips for Writing More Efficient Code
85	See Also
	HTML Performance Optimization
86	To Optimize or Not to Optimize
87	Key HTML Performance Issues
88	Responsive Handling of Replaced Elements
89	Handling Embedded Content
90	Handling Resource Loading Order
91	See Also
	CSS Performance Optimization
92	To Optimize or Not to Optimize
93	Optimizing Rendering
94	Handling Animations
95	Optimizing Element Changes with (will-change)
96	Optimizing for (render blocking)
97	Improving (font) performance
98	Optimizing Styling Recalculation with CSS Containment
99	See Also
	The Business Case for Web Performance
100	Making Performance a Business Priority
	Module-04: Testing
	Introduction to Cross-Browser Testing
101	What is Cross-Browser Testing?
102	Why Do Cross-Browser Issues Occur?
103	Workflows for Cross-Browser Testing
104	Reporting Bugs
105	Summary
	Strategies for Carrying Out Testing
106	Choosing Which Browser and Device to Test
107	What are You Going to Test?
108	Putting Together a Testing Lab
109	User Testing
110	Summary
	Handling Common HTML and CSS Problems
111	The Trouble with HTML and CSS
112	First Things First: Fixing General Problems
113	Common Cross Browser Problems
114	Finding Help
115	Summary
	Implementing Feature Detection
116	The Concept of Feature Detection
117	Writing Your Own Feature Detection Tests
118	Summary
	Introduction to Automated Testing
119	Automation Makes Things Easy
120	Using a Task Runner to Automate Testing Tools
121	Using Commercial Testing Services to Speed Up Browser Testign
122	Summary

	Setting Up Your Own Test Automation Environment
123	Selenium
124	Testing in Multiple Browsers at Once
125	WebDriver Syntax Crash Course
126	Test Best Practices
127	Running Remote Tests
128	Integrating Selenium with CI Tools
129	Summary
	Module-05: How to Solve Common Problems (Further Resources)
	Solve Common HTML Problems
130	Solve Common HTML Problems
131	Uncommon or Advanced Problems
132	See Also
	Solve Common CSS Problems
133	Styling Boxes
134	CSS and Text
135	CSS Layout
	Solve Common JavaScript Problems
136	Common Beginner's Mistakes
137	Basic Definitions
138	Basic Use Cases
139	Intermediate Use Cases
140	**Web Mechanics**
141	**Tools and Setup**
142	**Design and Accessibility**

Database Basic

W3Schools: SQL, MySQL (Topics: 114)

	W3Schools Database
	Module-01: SQL
	SQL Query
01	Home and Intro
02	Syntax
03	Select
04	Select Distinct
05	Where
06	Order By
07	And
08	Or
09	Not
10	Insert Into
11	Null Values
12	Update
13	Delete
14	Select Top
15	Aggregate Functions
16	Min and Max
17	Count
18	Sum
19	Avg
20	Like
21	Wildcards
22	In
23	Between
24	Aliases
25	Joins
26	Inner Join
27	Left Join
28	Right Join
29	Full Join
30	Self-Join
31	Union
32	Group By
33	Having
34	Exists
35	Any, All
36	Select Into
37	Insert Into Select
38	Case
39	Null Functions
40	Stored Procedures
41	Comments
42	Operators
	SQL Database
43	Create DB

44	Drop DB
45	Backup DB
46	Create Table
47	Drop Table
48	Alter Table
49	Constraints
50	Not Null
51	Unique
52	Primary Key
53	Foreign Key
54	Check
55	Default
56	Index
57	Auto Increment
58	Dates
59	Views
60	Injection
61	Hosting
62	Data Types
	SQL References
	SQL Keyworks
	MySQL Functions
	Module-02: MySQL
	MySQL Tutorial
63	Home
64	Intro
65	RDBMS
	MySQL SQL
66	SQL
67	SELECT
68	WHERE
69	AND, OR, NOT
70	ORDER BY
71	INSERT INTO
72	NULL Values
73	UPDATE
74	DELETE
75	LIMIT
76	MIN and MAX
77	COUNT, AVG, SUM
78	LIKE
79	Wildcards
80	IN
81	BETWEEN
82	Aliases
83	Joins
84	INNER JOIN
85	LEFT JOIN
86	RIGHT JOIN
87	CROSS JOIN
88	Self-Join

89	UNION
90	GROUP BY
91	HAVING
92	EXISTS
93	ANY, ALL
94	INSERT SELECT
95	Case
96	Null Functions
97	Comments
98	Operators
	MySQL Database
99	Create DB
100	Drop DB
101	Create Table
102	Drop Table
103	Alter Table
104	Constraints
105	Not Null
106	Unique
107	Primary Key
108	Foreign Key
109	Check
110	Default
111	Create Index
112	Auto Increment
113	Dates
114	Views
	MySQL Reverences
	Data Types
	Functions

W3Schools: MongoDB (Topics: 18)

	W3Schools Database
	Module-03: MongoDB
	MongoDb Tutorial
01	Home
02	Get Started
03	Query API
04	Create DB
05	Collection
06	Insert
07	Find
08	Update
09	Delete
10	Query Operators
11	Update Operators
12	Aggregations
13	Indexing/Search
14	Validation
15	Data API
16	Drivers
17	Node.js Driver
18	Charts

Fundamental Concepts

Web Technology

	Web Technology: Theory and Practice
	Internet Computing
	INTERconnected NETwork: Internet
01	Internet: The Giant Wide Area Network
03	Communicating Over the Internet – Topics 2
05	Accessing the Internet – Topics 2
06	Internet Organizations
07	Cyber Ethics
	Review Questions
	Internet Applications
08	Internet Services
10	Electronic Mail (Email) – Topics 2
13	File Transfer – Topics 3
17	Real-Time User Communication – Topics 4
18	Remote Login
19	Usenet – Topics 1
20	World Wide Web
	Review Questions
	Web Theory
	The World Wide Web
21	The Web
22	The Working Web
26	Web Terminology – Topics 4
27	Web Architecture
28	World Wide Web Challenges
	Review Questions
	Hypertext Transfer Protocol (HTTP)
29	Hypertext Transfer Protocol
30	Hypertext Transfer Protocol Version
31	Hypertext Transfer Protocol Connections – Topics 2
40	Hypertext Transfer Protocol Communication – Topics 9
41	Hypertext Transfer Protocol Secure
42	Hypertext Transfer Protocol State Retention: Cookies – Topics 1
43	Hypertext Transfer Protocol Cache – Topics 1
	Review Questions
	Evolution of Web
44	The Generations of Web
45	Web 1.0
53	Web 2.0 – Topics 8
57	Web 3.0 – Topics 4
58	Big Data: A Special Discussion
	Review Questions
	Web IR: Information Retrieval on the Web
59	Web Information Retrieval
61	Web Information Retrieval Tools – Topics
63	Web Information Retrieval Architecture (Search Engine Architecture) – Topics 2
64	Web Information Retrieval Performance Metrics

65	Web Information Retrieval Models
66	Google PageRank – Topics 1
	Review Questions
	Web Development
	Web Development Basics
67	Elements of Web Development
68	Client-Side and Server-Side Scripting
69	Model-View-Controller Architecture for Web Application Development
	Review Questions
	Client-Side Technologies
73	HTML: Hypertext Markup Language – Topics 4
76	CSS: Cascading Style Sheets – Topics 3
80	JavaScript – Topics 4
81	Bootstrap Framework
84	AngularJS Framework – Topics 3
	Review Questions
	Server-Side Technologies
85	Server-Side Scripting
94	Personal Home Pages – Topics 9
96	Node.js: Server-Side JavaScript – Topics 2
	Review Questions
	Web Application Frameworks
99	Django – Topics 3
102	Ruby on Rails – Topics 3
	Review Questions
	Web Databases
103	Web Database
104	Structured Query Language: Relational Databases
105	NoSQL Database: Non-Relational and Distributed Data
108	Understanding Popular Databases – Topics 3
	Review Questions
	Web Research
	Research Trends on the Web
111	Contextual Information Retrieval – Topics 3
114	Web Mining – Topics 3
	Review Questions
	Appendix A: HTML Examples
	Appendix B: A Recipe Web Site Project Using Django and Neo4j – Kitchen Ninja

Database Design

	Beginning Database Design Solution
	Part-01: Introduction to Database and Database Design
	Goals of Effective Database Design
01	Understanding the Importance of Design
02	Information Containers
03	Strengths and Weakness of Information Containers
19	Desirable Database Features – 16
	Summary
	Exercises
	Database Types
20	Why Bother?
22	Flat Files – Topics 2
23	Relational Database
24	Spreadsheets
25	Hierarchical Database
28	XML – Topics 3
29	Network
30	Object
31	Object-Relational
35	Exotic – Topics 4
	Summary
	Exercises
	Relational Database Fundamentals
36	Relational Points of View
37	Table, Rows, and Columns
38	Relations, Attributes, and Tuples
39	Keys
40	Indexes
45	Constraints – Topics 5
46	Database Operations
	Summary
	Exercises
	Part-02: Database Design Process and Techniques
	Understanding User Needs
47	Make a Plan
52	Bring a List of Questions – Topics 5
53	Meet the Customers
54	Learn Who's Who
55	Pick the Customers' Brains
56	Walk a Mile in the User's Shoes
57	Study Current Operations
58	Brainstorm
59	Look to the Future
60	Understand the Customers' Reasoning
61	Learning What the Customers Really Need
62	Prioritize
63	Verify Your Understanding
64	Write the Requirements Document

65	Make Use Cases
66	Decide Feasibility
	Summary
	Exercises
	Translating User Needs into Data Models
67	What are Data Models?
68	User Interface Models
75	Semantic Object Models – Topics 7
81	Entity-Relationship Models – Topics 6
83	Relational Models – Topics 2
	Summary
	Exercises
	Extracting Business Rules
84	What are Business Rules?
85	Identifying Key Business Rules
86	Extracting Key Business Rules
87	Multi-Tier Applications
	Summary
	Exercises
	Normalizing Data
88	What is Normalization?
89	First Normal Form (1NF)
90	Second Normal Form (2NF)
91	Third Normal Form (3NF)
92	Stopping at Third Normal Form
93	Boyce-Codd Normal Form (BCNF)
94	Fourth Normal Form (4NF)
95	Fifth Normal Form (5NF)
96	Domain/Key Normal Form (DKNF)
97	Essential Redundancy
98	The Best Level of Normalization
	Summary
	Exercises
	Designing Databases to Support Software Applications
99	Plan Ahead
100	Document Everything
101	Consider Multi-Tier Architecture
102	Convert Domains into Tables
103	Keep Tables Focused
104	Use Three Kinds of Tables
105	Use Naming Conventions
106	Allow Some Redundant Data
107	Don’t Squeeze in Everything
	Summary
	Exercises
	Common Design Patterns
112	Associations – Topics 5
115	Temporal Data – Topics 3
117	Logging and Locking – Topics 2
	Summary
	Exercises

	Common Design Pitfalls
118	Lack of Preparation
119	Poor Documentation
120	Poor Naming Standards
121	Thinking Tool Small
122	Not Planning for Change
123	Too Much Normalization
124	Insufficient Normalization
125	Insufficient Testing
126	Performance Anxiety
127	Mishmash Tables
128	Not Enforcing Constraints
129	Obsession with IDs
130	Not Defining Natural Keys
	Summary
	Exercises
	Part-03: A Detailed Case Study
	User Needs and Requirements
131	Meet the Customers
139	Pick the Customers' Brains – Topics 8
140	Write Use Cases
141	Write the Requirements Document
142	Demand Feedback
	Summary
	Exercises
	Building a Data Model
144	Semantic Object Modeling – Topics 2
147	Entity-Relationship Modeling – Topics 3
148	Relational Modeling
149	Putting It All Together
	Summary
	Exercises
	Extracting Business Rules
162	Identifying Business Rules – Topics 13
163	Drawing a New Relational Model
	Summary
	Exercise
	Normalization and Refinement
164	Improving Flexibility
165	Verifying First Normal Form
167	Verifying Second Normal Form – Topics 2
168	Verifying Third Normal Form
	Summary
	Exercises
	Part-04: Implementing Databases
169	**Microsoft Access**
170	Understanding Access
171	Getting Started
172	Defining Relationships
173	Creating Field Constraints
174	Creating Table Constraints

176	Crating Queries – Topics 2
	MySQL
177	Installing MySQL
178	Using MySQL Command Line Client
179	Executing SQL Scripts
184	Using MySQL Query Browser – Topics 5
189	Using MySQL Workbench – Topics 5
	Summary
	Exercises
	Part-05: Advanced Topics
	Introduction to SQL
190	Background
191	Finding More Information
192	Standards
193	Basic Syntax
194	Command Overview
195	CREATE TABLE
196	CREATE INDEX
197	DROP
198	INSERT
203	SELECT – Topics 5
204	UPDATE
205	DELETE
	Summary
	Exercises
	Building Databases with SQL Scripts
206	Why Bother with Scripts?
211	Script Categories – Topics 5
212	Ordering SQL Commands
	Summary
	Exercises
	Database Maintenance
213	Backups
214	Data Warehousing
215	Repairing the Database
216	Compacting the Database
217	Performance Tuning
	Summary
	Exercises
	Database Security
218	The Right Level of Security
222	Passwords – Topics 4
223	Privileges
224	Initial Configuration and Privileges
225	Too Much Security
226	Physical Security
	Summary
	Exercises
243	Appendix: Sample Database Design – Topics 17

Calculus and Analytical Geometry

Calculus and Analytical Geometry: Reference-1

	Calculus and Analytic Geometry
	Preliminaries
07	Real Numbers and the Real Line – Topics 7
15	Coordinates, Lines and Increments – Topics 8
24	Functions – Topics 9
29	Shifting Graphs – Topics 5
34	Trigonometric Functions – Topics 5
	Questions to Guide Your Review and Practice Exercise
	Additional Exercises – Theory, Examples, Applications
	Limits and Continuity
37	Rates of Change and Limits – Topics 3
41	Rules for Finding Limits – Topics 4
47	Target Values and Formal Definitions of Limits – Topics 6
52	Extensions of the Limit Concept – Topics 5
60	Continuity – Topics 8
63	Tangent Lines – Topics 3
	Questions to Guide Your Review and Practice Exercise
	Additional Exercises – Theory, Examples, Applications
	Derivatives
70	The Derivative of a Function – Topics 7
78	Differentiation Rules – Topics 8
83	Rates of Change – Topics 5
93	Derivatives of Trigonometric Functions – Topics 10
99	The Chain Rule – Topics 6
103	Implicit Differentiation and Rational Exponents – Topics 4
105	Related Rates of Change – Topics 2
	Questions to Guide Your Review and Practice Exercise
	Additional Exercises – Theory, Examples, Applications
	Applications of Derivatives
111	Extreme Values of Functions – Topics 6
119	The Mean Value Theorem – Topics 8
120	The First Derivative Test for Local Extreme Values – Topics 1
125	Graphing with y` and y`` - Topics 5
134	Limits as x->+-alfa, Asymptotes, and Dominant Terms – Topics 9
141	Optimization – Topics 7
149	Linearization and Differentials – Topics 8
154	Newton's Method – Topics 5
	Questions to Guide Your Review and Practice Exercise
	Additional Exercises – Theory, Examples, Applications
	Integration
158	Indefinite Integrals – Topics 4
162	Differential Equations, Initial Value Problems, and Mathematical Modeling – Topics 4
165	Integration by Substitution – Running the Chain Rule Backward – Topics 3
170	Estimating with Finite Sums – Topics 5
180	Riemann Sums and Definite Integrals – Topics 10
184	Properties, Area, and the Mean Value Theorem – Topics 4
188	The Fundamental Theorem – Topics 4

189	Substitution in Definite Integrals – Topics 1
196	Numerical Integration – Topics 7
	Questions to Guide Your Review and Practice Exercise
	Additional Exercises – Theory, Examples, Applications
	Applications of Integrals
202	Areas Between Curves – Topics 6
204	Finding Volumes by Slicing – Topics 2
208	Volumes of Solids of Revolution – Disks and Washers – Topics 4
210	Cylindrical Shells – Topics 2
214	Lengths of Plane Curves – Topics 4
218	Areas of Surfaces of Revolution – Topics 4
222	Moments and Centers of Mass – Topics 4
226	Work – Topics 4
232	Fluid Pressures and Forces – Topics 6
237	The Basic Pattern and Other Modeling Applications – Topics 5
	Questions to Guide Your Review and Practice Exercise
	Additional Exercises – Theory, Examples, Applications
	Transcendental Functions
243	Inverse Functions and Their Derivatives – Topics 6
250	Natural Logarithms – Topics 7
254	The Exponential Function – Topics 4
263	Ax and logaX – Topics 9
267	Growth and Decay – Topics 4
272	L'Hopital's Rules – Topics 5
276	Relative Rates of Growth – Topics 4
279	Inverse trigonometric Functions – Topics 3
283	Derivatives of Inverse trigonometric Functions; Integrals – Topics 4
287	Hyperbolic Functions – Topics 4
291	First Order Differential Equations – Topics 4
265	Euler's Numerical Method: Slope Fields – Topics 4
	Questions to Guide Your Review and Practice Exercise
	Additional Exercises – Theory, Examples, Applications
	Techniques of Integration
267	Basic Integration Formulas – Topics 2
271	Integration by Parts – Topics 4
275	Partial Fractions – Topics 4
276	Trigonometric Substitutions – Topics 1
280	Integral tables and CAS – Topics 4
281	Improper Integrals – Topics 1
	Questions to Guide Your Review and Practice Exercise
	Additional Exercises – Theory, Examples, Applications
	Infinite Series
285	Limits of Sequences of Numbers – Topics 4
293	Theorems for Calculation Limits of Sequences – Topics 7
298	Infinite Series – Topics 5
30	The Integral Test for Series of Nonnegative Terms – Topics 2
302	Comparison Tests for Series of Nonnegative Terms – Topics 2
304	The Ration and Root Tests for Series of Nonnegative Terms – Topics 2
306	The Ratio and Root Tests for Series of Nonnegative Terms – Topics 2
310	Alternating Series, Absolute and Conditional Convergence – Topics 4
315	Power Series – Topics 5

318	Taylor and Maclaurin Series – Topics 3
323	Convergence of Taylor Series; Error Estimates – Topics 5
328	Applications of Power Series – Topics 5
	Questions to Guide Your Review and Practice Exercise
	Additional Exercises – Theory, Examples, Applications
	Conic Sections, Parametrized Curves, and Polar Coordinates
336	Conic Sections and Quadratic Equations – Topics 8
339	Classifying Conic Sections by Eccentricity – Topics 3
343	Quadratic Equations and Rotations – Topics 4
345	Parametrizations of Plane Curves – Topics 2
349	Calculus with Parametrized Curves – Topics 4
353	Polar Coordinates – Topics 4
358	Graphing in Polar Coordinates – Topics 5
361	Polar Equations for Conic Sections – Topics 3
364	Integration in Polar Coordinates – Topics 3
	Questions to Guide Your Review and Practice Exercise
	Additional Exercises – Theory, Examples, Applications
	Vectors and Analytic Geometry in Space
373	Vectors in the Plane – Topics 9
381	Cartesian (Rectangular) Coordinates and Vectors in Space – Topics 8
386	Dot Products Cross Products – Topics 5
390	Lines and Planes in Space – Topics 4
395	Cylinders and Quadric Surfaces – Topics 5
397	Cylindrical and Spherical Coordinates – Topics 2
	Questions to Guide Your Review and Practice Exercise
	Additional Exercises – Theory, Examples, Applications
	Vector-Valued Functions and Motion in Space
405	Vector-Valued Functions and Space Curves – Topics 8
408	Modeling Projectile Motion – Topics 3
410	Arc Length and the Unit Tangent Vector – Topics 2
416	Curvature, Torsion, and the TNB Frame – Topics 6
422	Planetary Motion and Satellites – Topics 6
	Questions to Guide Your Review and Practice Exercise
	Additional Exercises – Theory, Examples, Applications
	Multivariable Functions and Partial Derivatives
427	Functions of Several Variables – Topics 5
433	Limits and Continuity – Topics 6
438	Partial Derivatives – Topics 5
442	Differentiability, Linearization, and Differentials – Topics 4
447	The Chain Rule – Topics 5
450	Partial Derivatives with Constrained Variables – Topics 3
459	Directional Derivatives, Gradient Vectors, and Tangent Planes – Topics 9
463	Extreme Values and Saddle Points – Topics 4
467	Lagrange Multipliers – Topics 4
470	Taylor's Formula – Topics 3
	Questions to Guide Your Review and Practice Exercise
	Additional Exercises – Theory, Examples, Applications
	Multiple Integrals
478	Double Integrals – Topics 8
482	Areas, Moments, and Centers of Mass – Topics 4
485	Double Integrals in Polar Form – Topics 3

488	Triple Integrals in rectangular Coordinates – Topics 3
492	Masses and Moments in Three Dimensions – Topics 4
496	Triple Integrals in Cylindrical and Spherical Coordinates – Topics 4
498	Substitutions in Multiple Integrals – Topics 2
	Questions to Guide Your Review and Practice Exercise
	Additional Exercises – Theory, Examples, Applications
	Integration in Vector Fields
501	Line Integrals – Topics 3
506	Vector Fields, Work, Circulation, and Flux – Topics 5
512	Path Independence, Potential Functions, and Conservative Fields – Topics 6
519	Green's Theorem in the Plane – Topics 7
526	Surface Area and Surface Integrals – Topics 6
530	Parametrized Surfaces – Topics 4
536	Stokes's Theorem – Topics 6
543	The Divergence Theorem and a Unified Theory – Topics 7
	Questions to Guide Your Review and Practice Exercise
	Additional Exercises – Theory, Examples, Applications
	Appendices
	Mathematical Induction
	Proofs of Limit Theorems in Section
	Complex Numbers
	Simpson's One-Third Rule
	Cauchy's Mean Value Theorem and the Stronger Form of l'Hopital's Rule
	Limits That Arise Frequently
	The Distributive Law for Vector Cross Products
	Determinants and Craner's Rule
	Euler's Theorem and the Increment Theorem

Calculus and Analytical Geometry: Reference-2

	Advanced Engineering Mathematics
	Ordinary Differential Equations
	First-Order ODEs
04	Basic Concepts. Modeling – Topics 4
06	Geometric Meaning of y = f(x, y). Direction Fields, Euler's Method – Topics 2
11	Separable ODEs. Modeling – Topics 5
14	Exact ODEs. Integrating Factors – Topics 3
18	Linear ODEs. Bernoulli Equations. Population Dynamics – Topics 4
19	Orthogonal Trajectories. Optional – Topics 1
21	Existence and Uniqueness of Solutions for Initial Value Problems – Topics 2
	Review Questions and Problems
	Summary
	Second-Order Linear ODEs
25	Homogeneous Linear ODEs of Second Order – Topics 4
30	Homogeneous Linear ODEs with Constant Coefficients – Topics 5
31	Differential Operators. Optional – Topics 1
35	Modeling of Free Oscillations of a Mass-Spring System – Topics 4
36	Euler-Cauchy Equations – Topics 1
39	Existence and Uniqueness of Solutions. Wronskian – Topics 3
43	Nonhomogeneous ODEs – Topics 4
47	Modeling: Forced Oscillations. Resonance – Topics 4
50	Modeling: Electric Circuits – Topics 3
52	Solution by Variation of Parameters – Topics 2
	Review Questions an Problems
	Summary
	Higher Order Linear ODEs
57	Homogeneous Linear ODEs – Topics 5
62	Homogeneous Linear ODEs with Constant Coefficients – Topics 5
66	Nonhomogeneous Linear ODEs – Topics 4
	Review Questions and Problems
	Summary
	Systems of ODEs Phase Plane Qualitative Methods
72	For Reference: Basics of Matrices and Vectors – Topics 6
74	Systems of ODEs as Models in Engineering Applications – Topics 2
77	Basic Theory of Systems of ODEs. Wronskian – Topics 3
82	Constant-Coefficient System. Phase Plane Method – Topics 5
83	Criteria for Critical Points. Stability – Topics 1
87	Qualitative Methods for Nonlinear Systems – Topics 4
90	Nonhomogeneous Linear Systems of ODEs – Topics 3
	Review Questions and Problems
	Summary
	Series Solutions of ODEs. Special Functions
94	Power Series Method – Topics 4
96	Legendre's Equations. Legendre Polynomials Pn(x) – Topics 2
99	Extended Power Series Methods: Frobenius Method – Topics 3
105	Besel's Equation. Bessel Functions Jv(x) – Topics 6
107	Bessel Functions of the Yv(x). General Solution – Topics 2
	Review Questions and Problems

	Summary
	Laplace Transforms
111	Laplace Transform. Linearity. First Shifting Theorem (s-Shifting) – Topics 4
114	Transforms of Derivatives and Integrals. ODEs – Topics 3
117	Unit Step Function (Heaviside Function). Second Shifting Theorem (t-Shifting) – Topics 3
121	Short Impulses. Dirac's Delta Function. Partial Fractions – Topics 4
125	Convolution. Integral Equations – Topics 4
128	Differentiation and Integration of Transforms ODEs with Variable Coefficients – Topics 3
131	Systems of ODEs – Topics 3
132	Laplace Transform: General Formulas
133	Table of Laplace Transforms
	Review Questions and Problems
	Summary
	Linear Algebra. Vector Calculus
	Linear Algebra: Matrices, Vectors, Determinants. Linear Systems
136	Matrices, Vectors: Addition and Scalar Multiplication – Topics 3
141	Matrix Multiplication – Topics 5
146	Linear Systems of Equations. Gauss Elimination – Topics 5
149	Linear Independence. Rank of a Matrix. Vector Space – Topics 3
152	Solutions of Linear Systems: Existence, Uniqueness – Topics 3
154	For Reference: Second- and Third-Order Determinants – Topics 2
157	Determinants. Cramer's Rule – Topics 3
162	Inverse of a Matrix. Gauss-Jordan Elimination – Topics 5
166	Vector Spaces, Inner Product Spaces. Linear Transformations. Optional – Topics 4
	Review Questions and Problems
	Summary
	Linear Algebra: Matrix Eigenvalue Problems
169	The Matrix Eigenvalue Problem. Determining Eigenvalue and Eigenvectors – Topics 3
171	Some Applications of Eigenvalue Problems – Topics 2
173	Symmetric, Skew-Symmetric, and Orthogonal Matrices – Topics 2
176	Eigenbases, Diagonalization. Quadratic Forms – Topics 3
179	Complex Matrices and Forms. Optional – Topics 3
	Review Questions and Problems
	Summary
	Vector Differential Calculus. Grad, Div, Curl
182	Vectors in 2-Space and 3-Space – Topics 3
185	Inner Product (Dot Product) – Topics 3
189	Vector Product (Cross Product) – Topics 4
192	Vector and Scalar Functions and Their Fields. Vector Calculus: Derivatives – Topics 3
198	Curves. Arc Length. Curvature. Torsion – Topics 6
200	Calculus Review: Functions of Several Variables. Optional – Topics 2
205	Gradient of a Scalar Field. Directional Derivative – Topics 5
207	Divergence of a Vector Field – Topics 2
208	Curl of a Vector Field – Topics 1
	Review of Questions and Problems
	Summary
	Vector Integral Calculus. Integral Theorems
213	Line Integrals – Topics 5
216	Path Independence of Line Integrals – Topics 3
220	Calculus Review: Double Integrals. Optional – Topics 4
222	Green's Theorem in the Plane – Topics 2

224	Surfaces for Surface Integrals – Topics 2
227	Surface Integrals – Topics 3
230	Triple Integrals. Divergence Theorem of Gauss – Topics 3
232	Further Applications of the Divergence Theorem – Topics 2
235	Stokes's Theorem – Topics 3
	Review Questions and Problems
	Summary
	Fourier Analysis. Partial Differential Equations (PDEs)
	Fourier Analysis
239	Fourier Series – Topics 4
242	Arbitrary Period. Even and Odd Functions. Half-Range Expansions – Topics 3
243	Forced Oscillations – Topics 1
244	Approximation by Trigonometric Polynomials – Topics 1
247	Sturm-Liouville Problems. Orthogonal Functions – Topics 3
250	Orthogonal Series. Generalized Fourier Series – Topics 3
254	Fourier Integral – Topics 4
257	Fourier Cosine and Sine Transforms – Topics 3
263	Fourier Transform. Discrete and Fast Fourier Transforms – Topics 6
264	Tables of Transforms
	Review Questions and Problems
	Summary
	Partial Differential Equations (PDEs)
265	Basic Concepts of PDEs – Topics 1
267	Modeling: Vibrating String, Wave Equation – Topics 2
270	Solution by Separating Variables. Use of Fourier Series – Topics 3
273	D'Alembert's Solution of the Wave Equation. Characteristics – Topics 2
275	Modeling: Heat Flow from a Body in Space. Heat Equation – Topics 1
276	Heat Equation: Solution by Fourier Series. Steady Two-Dimensional Heat Problems. – Topics 5
279	Heat Equation: Modeling Very Long Bars. Solution by Fourier Integrals and Transforms – Topics 3
280	Modeling: Membrane, Two-Dimensional Wave Equation – Topics 1
284	Rectangular Membrane. Double Fourier Series – Topics 4
289	Laplacian I Polar Coordinates. Circular Membrane. Fourier-Bessel Series – Topics 5
294	Laplace's Equation in Cylindrical and Spherical Coordinates. Potential – Topics 5
295	Solution of PDEs by Laplace Transforms – Topics 1
	Review Questions and Problems
	Summary
	Complex Analysis
	Complex Numbers and Functions. Complex Differentiation
300	Complex Numbers and Their Geometric Representation – Topics 5
302	Polar Form of Complex Numbers. Powers and Roots – Topics 2
308	Derivative. Analytic Function – Topics 6
310	Cauchy-Riemann Equations. Laplace's Equation – Topics 2
311	Exponential Function – Topics 1
313	Trigonometric and Hyperbolic Functions. Euler's Formula – Topics 2
315	Logarithm. General Power. Principal Value – Topics 2
	Review Questions and Problems
	Summary
	Complex Integration
322	Line Integral in the Complex Plane – Topics 7
328	Cauchy's Integral Theorem – Topics 6
329	Cauchy's Integral Formula – Topics 1

331	Derivatives of Analytic Functions – Topic 2
	Review Questions and Problems
	Summary
	Power Series, Taylor Series
336	Sequences, Series, Convergence Tests – Topics 5
339	Power Series – Topics 3
342	Functions Given by Power Series – Topics 3
346	Taylor and Maclaurin Series – Topics 4
350	Uniform Convergence. Optional – Topics 4
	Review Questions and Problems
	Summary
	Laurent Series. Residue Integration
352	Laurent Series – Topics 2
356	Singularities and Zeros. Infinity – Topic 4
359	Residue Integration Method – Topics 3
363	Residue Integration of Real Integrals – Topics 4
	Review Questions and Problems
	Summary
	Conformal Mapping
366	Geometry of Analytic Functions: Conformal Mapping – Topics 3
369	Linear Fractional Transformations (Mobius Transformations) – Topics 3
371	Special Linear Functional Transformations – Topics 2
372	Conformal Mapping by Other Functions – Topics 1
373	Riemann Surfaces. Optional – Topics 1
	Review Questions and Problems
	Summary
	Complex Analysis and Potential Theory
376	Electrostatic Fields – Topics 3
377	Use of Conformal Mapping. Modeling – Topics 1
378	Heat Problems – Topics 1
381	Fluid Flow – Topics 3
383	Poisson's Integral Formula for Potentials – Topic 2
384	General Properties of Harmonic Functions. Uniqueness Theorem for the Dirichlet Problem – Topics 1
	Review Question and Problems
	Summary
	Numeric Analysis
	Software
	Numeric in General
392	Introduction – Topics 8
398	Solution of Equations by Iteration – Topics 6
403	Interpolation – Topics 5
404	Spline Interpolation – Topics 1
411	Numeric Integration and Differentiation – Topics 7
	Review Questions and Problems
	Summary
	Numeric Linear Algebra
415	Linear Systems: Gauss Elimination – Topics 4
417	Linear Systems: LU-Factorization, Matrix Inversion – Topics 3
420	Linear Systems: Solution by Iteration – Topics 3
424	Linear Systems: Ill-Conditioning, Norms – Topics 4
426	Least Squares Method – Topics 2

427	Matrix Eigenvalue Problems: Introduction – Topics 1
429	Inclusion of Matrix Eigenvalues – Topics 2
430	Power Method for Eigenvalues – Topics 1
433	Tridiagonalization and QR-Factorization – Topics 3
	Review Questions and Problems
	Summary
	Numeric for ODEs and PDEs
437	Methods for First-Order ODEs – Topics 4
439	Multistep Methods – Topics 2
444	Methods for Systems and Higher Order ODEs – Topics 5
448	Methods for Elliptic PDEs – Topics 4
450	Neumann and Mixed Problems. Irregular Boundary – Topics 2
452	Methods for Parabolic PDEs – Topics 2
453	Method for Hyperbolic PDEs – Topics 1
	Review Questions and Problems
	Summary
	Optimization, Graphs
	Unconstrained Optimization. Linear Programming
454	Basic Concepts. Unconstrained Optimization: Method of Steepest Descent – Topics 1
456	Linear Programming – Topics 2
457	Simplex Method – Topics 1
459	Simplex Method: Difficulties – Topics 2
	Review Questions and Problems
	Summary
	Graphs. Combinatorial Optimization
462	Graphs and Digraphs – Topics 3
465	Shortest Path Problems. Complexity – Topics 3
467	Bellman's Principle. Dijkstra's Algorithm – Topics 2
468	Shortest Spanning Trees: Greedy Algorithm – Topics 1
469	Shortest Spanning Trees: Prim's Algorithm – Topics 1
472	Flows in Networks – Topics 3
474	Maximum Flow: Ford-Fulkerson Algorithm – Topics 2
475	Bipartite Graphs. Assignment Problems – Topics 1
	Review Questions and Problems
	Summary
	Probability, Statistics Software
	Data Analysis. Probability Theory
479	Data Representation. Average. Spread – Topics 4
481	Experiments, Outcomes, Events – Topics 2
484	Probability – Topics 3
488	Permutations and Combinations – Topics 4
491	Random Variables. Probability Distributions – Topics 3
494	Mean and Variance of a Distribution – Topics 3
497	Binomial, Poisson, and Hypergeometric Distributions – Topics 3
501	Normal Distribution – Topics 4
509	Distributions of Several Random Variables – Topics 8
	Review Questions and Problems
	Summary
	Mathematical Statistics
510	Introduction. Random Sampling – Topics 1
513	Point Estimation of Parameters – Topics 2

518	Confidence Intervals – Topics 5
524	Testing Hypotheses. Decisions – Topics 6
528	Quality Control – Topics 4
531	Acceptance Sampling – Topics 3
532	Goodness of Fit X2-Test – Topics 1
533	Non-parametric Tests – Topics 1
537	Regression. Fitting Straight Lines. Correlation – Topics 4
	Review Questions and Problems
	Summary

Software Architecture and Design

Software Architecture and Design: Reference-1

	Fundamentals of Software Architecture: An Engineering Approach
	Introduction
01	Defining Software Architecture
05	Expectations of an Architect – Topics 4
09	Expectations of an Architect – Topics 4
13	Intersection of Architecture and… - Topics 4
14	Laws of Software Architecture
	Part-01: Foundations
	Architectural Thinking
15	Architecture Versus Design
16	Technical Breadth
17	Analyzing Trade-Offs
18	Understanding Business Drivers
19	Balancing Architecture and Hands-On Coding
	Modularity
20	Definition
26	Measuring Modularity – Topics 6
27	From Modules to Components
	Architecture Characteristics Defined
30	Architectural Characteristics (Partially) Listed – Topics 3
31	Trade-Offs and Least Worst Architecture
	Identifying Architectural Characteristics
32	Extracting Architecture Characteristics from Domain Concerns
33	Extracting Architecture Characteristics from Requirements
35	Case Study: Silicon Sandwiches – Topics 2
	Measuring and Governing Architecture Characteristics
38	Measuring Architecture Characteristics – Topics 3
40	Governance and Fitness Functions – Topics 2
	Scope of Architecture Characteristics
41	Coupling and Connascence
42	Architectural Quanta and Granularity
43	Case Study: Going, Going, Gone
	Component-Based Thinking
44	Component Scope
46	Architect Role – Topics 2
47	Developer Role
52	Component Identification Flow – Topics 5
53	Component Granularity
54	Component Design | Discovering Components
55	Case Study: Going, Going, Gone: Discovering Components
56	Architecture Quantum Redux: Choosing Between Monolithic Versus Distributed Architectures
	Part-02: Architecture Styles
	Foundations
59	Fundamental Patterns – Topics 3
64	Monolithic Versus Distributed Architectures – Topics 5
68	Monolithic Versus Distributed Architectures – Topics 4
	Layered Architecture Style

69	Topology
70	Layers of Isolation
71	Adding Layers
72	Other Considerations
73	Why Use This Architecture Style
74	Architecture Characteristics Ratings
	Pipeline Architecture Style
76	Topology – Topics 2
77	Example
78	Architecture Characteristics Ratings
	Microkernel Architecture Style
80	Topology – Topics 2
81	Registry
82	Contracts
83	Examples and Use Cases
84	Architecture Characteristics Ratings
	Service-Based Architecture Style
85	Topology
86	Topology Variants
87	Service Design and Granularity
88	Database Partitioning
89	Example Architecture
90	Architecture Characteristics Ratings
91	When to Use This Architecture Style
	Event-Driven Architecture Style
92	Topology
93	Broker Topology
94	Mediator Topology
95	Asynchronous Capabilities
96	Error Handling
97	Preventing Data Loss
98	Broadcast Capabilities
99	Request-Reply
100	Choosing Between Request-Based and Event-Based
101	Hybrid Event-Driven Architectures
102	Architecture Characteristics Ratings
	Space-Based Architecture Style
107	General Topology – Topics 5
108	Data Collisions
109	Cloud Versus On-Premises Implementations
110	Replicated Versus Distributed Caching
111	Near-Cache Considerations
113	Implementation Examples – Topics 2
114	Architecture Characteristics Ratings
	Orchestration-Driven Service-Oriented Architecture
115	History and Philosophy
116	Tropology
122	Taxonomy – Topics 6
123	Reuse…and Coupling
124	Architecture Characteristics Ratings
	Micro services Architecture

125	History
126	Topology
127	Distributed
128	Bounded Context
129	Granularity
130	Data Isolation
131	API Layer
132	Operational Reuse
133	Frontends
135	Communication – Topics 2
136	Architecture Characteristics Ratings
137	Additional References
	Choosing the Appropriate Architecture Style
138	Shifting “Fashion” in Architecture
139	Decision Criteria
141	Monolith Case Study: Silicon Sandwiches – Topics 2
142	Distributed Case Study: Going, Going, Gone
	Part-03: Techniques and Soft Skills
	Architecture Decisions
145	Architecture Decision Anti-Patterns – Topics 3
146	Architecturally Significant
151	Architecture Decision Records – Topics 5
	Analyzing Architecture Risk
152	Risk Matrix
153	Risk Assessments
155	Risk Storming – Topics 2
156	Agile Story Risk Analysis
159	Risk Storming Examples – Topics 3
	Diagramming and Presenting Architecture
162	Diagramming – Topics 3
167	Presenting – Topics 5
	Making Teams Effective
168	Team Boundaries
171	Architect Personalities – Topics 3
172	How Much Control?
173	Team Warning Signs
176	Leveraging Checklists – Topics 3
177	Providing Guidance
178	Summary
	Negotiation and Leadership Skills
181	Negotiation and Facilitation – Topics 3
184	The Software Architect as a Leader – Topics 3
185	Integrating with the Development Team
186	Summary
	Developing a Career Path
187	The 20-Minute Rule
189	Developing a Personal Radar – Topics 2
190	Using Social Media
191	Parting Words of Advice

Software Architecture and Design: Reference-2

	Software Design Methodology
	Basic Concepts of Design
01	Introduction
02	Characteristics of Design Activities – Topics 4
03	Characteristics of Design Activities – Topics 3
04	Essential Elements of Designs – Topics 3
05	Essential Elements of Designs – Topics 3
06	The Factors that Affect Designs
07	Summary
08	Exercises
	Design Quality
09	Software Quality Models – Topics 2
10	The Effect of Design on Software Quality – Topics 3
11	The Effect of Design on Software Quality – Topics 3
12	Quality Attributes of Software Design – Topics 3
13	Summary
14	Exercises
	Design Principles
15	Basic Rules of Software Design – Topics 3
16	Design Processes – Topics 3
17	Structure of Software Design Methods
18	Summary
19	Exercises
	Software Architecture
20	The Notion of Architecture – Topics 3
21	The Notion of Software Architecture – Topics 4
22	Software Architectural Style – Topics 2
23	Summary
24	Exercises
	Description of Software Architectures
25	The Visual Notation – Topics 4
26	Examples 1: www client-server pair
27	Examples 2: robot soccer UNSW
28	Examples 3: Training Centers' Management Information System
29	Summary
30	Exercises
	Typical Architectural Styles
31	Data Flow – Topics 3
32	Independent Components – Topics 3
33	Call and Return – Topics 3
34	Data-centered
35	Virtual Machine
36	Summary
37	Exercises
	Using Styles In Design
38	Choices of Styles
39	Combinations of Styles – Topics 3
40	Case Study: Keyword Frequency Vector – Topics 3

41	Summary
42	Exercises
	Architectural Design Space
43	Theory of Design Spaces – Topics 2
44	Design Space of Architectural Elements – Topics 2
45	Design Space of Architectural Styles – Topics 2
46	Summary
47	Exercises
	Scenario-Based Analysis and Evaluation
48	The Concept of Scenario
49	Scenarios for Evaluating Modifiability – Topics 5
50	Scenarios for Evaluating Performance – Topics 2
51	Scenarios for Evaluating Reusability
52	Summary
53	Exercises
	Analysis and Evaluation of Modifiability: The SAAM Method
54	The Input and Output
55	The Process – Topics 6
56	Case Study: Analyzing Architectural Designs of Keyword Frequency Vector Extraction System – Topics 6
57	Summary
58	Exercises
	Quality Trade-Off Analysis: The ATAM Method
59	ATAM Analysis Process
60	ATAM Analysis Activities – Topics 5
61	ATAM Analysis Activities – Topics 4
62	Summary
63	Exercises
	Model-Based Analysis: The HASHRD Method
64	Representation of Quality Models
65	Construction of Quality Models – Topics 4
66	Derivation of Quality Features – Topics 4
67	Case Study: Client-Server Web Systems – Topics 3
68	Summary
69	Exercises
	Learning JavaScript Design Patterns

Software Architecture and Design: Reference-3

	Design Patterns: Elements of Reusable Object-Oriented Software
	Introduction
01	What is a Design Pattern?
02	Design Patterns in Smalltalk MVC
03	Describing Design Patterns
04	The Catalog of Design Patterns
05	Organizing the Catalog
06	How Design Patterns Solve Design Problems
07	How to Select a Design Pattern
08	How to Use a Design Pattern
	A Case Study: Designing a Document Editor
09	Design Problems
10	Document Structure
11	Formatting
12	Embellishing the User Interface
13	Supporting Multiple Look-and-Feel Standards
14	Supporting Multiple Window Systems
15	User Operations
16	Spelling Checking and Hyphenation
	Summary
	Design Pattern Catalog
	Creational Patterns
17	Abstract Factory
18	Builder
19	Factory Method
20	Prototype
21	Singleton
	Discussion of Creational Patterns
	Structural Patterns
22	Adapter
23	Bridge
24	Composite
25	Decorator
26	Façade
27	Flyweight
28	Proxy
	Discussion of Structural Patterns
	Behavioral Patterns
29	Chain of Responsibility
30	Command
31	Interpreter
32	Mediator
33	Memento
34	Observer
35	State
36	Strategy
37	Template Method
38	Visitor

	Discussion of Behavioral Patterns
	Conclusion
39	What to Expect from Design Patterns
40	A Brief History
41	The Pattern Community
42	An Invitation
43	A Parting Thought
	Glossary
	Guide to Notation
44	Class Diagram
45	Object Diagram
46	Interaction Diagram
	Foundation Classes
47	List
48	Iterator
49	ListIterator
50	Point
51	Rect

UML

	Modeling with UML: Language, Concepts, Methods
	Introduction
01	Goals of Book 1 and 2
02	Overview
03	Notational Conventions
08	Placement of UML/P – Topics 5
09	The Future: Agile Modeling with UML
	Class Diagrams
10	Relevance of Class Diagrams
15	Classes and Inheritance – Topics 5
23	Associations – Topics 8
24	View and Representation
27	Stereotypes and Tags – Topics 3
	Object Constraint Language
32	Overview of OCL/P – Topics 5
36	The OCL Logic – Topics 4
48	Container Data Structures – Topics 12
53	Functions in OCL – Topics 5
56	Expressiveness of OCL – Topics 3
57	Summary
	Object Diagrams
64	Introduction to Object Diagrams – Topics 7
68	Meaning of an Object Diagram – Topics 4
75	Logic of Object Diagrams – Topics 7
83	Methodical Use of Object Diagrams – Topics 8
84	Summary
	Statecharts
85	Properties of Statecharts
94	Automaton Theory and Its Interpretation – Topics 9
98	States – Topics 4
104	Transitions – Topics 6
109	Actions – Topics 5
113	Statecharts in the Context of UML – Topics 4
114	Summary
	Sequence Diagrams
115	Concepts of Sequence Diagrams
116	OCL in Sequence Diagrams
117	Semantics of a Sequence Diagram
118	Special Cases and Extensions for Sequence Diagrams
119	Sequence Diagrams in UML
120	Summary
121	**Further Reading**
122	**Language Representation with Syntax Class Diagrams**
123	**The Syntax of UML/P – Topics 17**
124	**Sample Application: Internet-Based Auction System – Topics 2**

Software Documentation

	Docs for Developers
	Understanding Your Audience
01	Corg.ly: One month to launch
02	The Curse of Knowledge
05	Creating and Initial Sketch of Your Users – Topics 3
07	Validate Your User Understanding – Topics 2
10	Condensing User Research Findings – Topics 3
11	Creating a Friction Log
12	Summary
	Planning Your Documentation
13	Corg.ly: Creating a Plan
14	Plans and Patterns
21	Content Types – Topics 7
22	Planning Your Documentation
23	Summary
	Drafting Documentation
24	Corg.ly: First Drafts
25	Confronting The Blank Page (or Screen)
28	Setting Yourself Up for Writing Success – Topics 3
30	Creating Your Outline – Topics 2
35	Creating Your Draft – Topics 5
39	Writing for Skimming – Topics 4
44	Getting Unstuck – Topics 5
45	Working From Templates
46	Finishing Your First Draft
47	Summary
	Editing Documentation
48	Corg.ly: Editing Content
49	Editing to Meet Your User's Needs
53	Different Approaches to Editing – Topics 4
56	Creating an Editing Process – Topics 3
57	Receiving and Integrating Feedback
58	Giving Good Feedback
59	Summary
	Integrating Code Samples
60	Corg.ly: Showing How It Works
61	Using Code Samples
62	Types of Code Samples
67	Principles of Good Code Samples – Topics 5
70	Designing Code Samples – Topics 3
73	Tooling for Code Samples – Topics 3
74	Summary
	Adding Visual Content
75	Corg.ly: Worth a Thousand Words
76	When Words aren't Enough
79	Why Visual Content is Hard to Create – Topics 3
80	Using Screenshots
83	Common Types of Diagrams – Topics 3

90	Drawing Diagrams – Topics 7
91	Creating Video Content
92	Reviewing Visual Content
93	Maintaining Visual Content
94	Summary
	Publishing Documentation
95	Corg.ly: Ship it
96	Putting Your Content Out There
97	Building a Content Release Process
101	Creating a Publishing Timeline – Topics 4
102	Planning for the future
103	Summary
	Gathering and Integrating Feedback
104	Corg.ly: Initial Feedback
105	Listening to Your Users
110	Creating Feedback Channels – Topics 5
112	Converting Feedback into Action – Topics 2
113	Summary
	Measuring Documentation Quality
114	Corg.ly: Tuesday After the Launch
115	Is My Documentation Any Good?
118	Understanding Documentation Quality – Topics 3
121	Creating a Strategy for Analytics – Topics 3
126	Tips for Using Document Metrics – Topics 5
127	Summary
	Organizing Documentation
128	Corg.ly: The Next Release
129	Organizing Documentation for Your Readers
132	Helping Your Readers Find Their Way – Topics 3
136	Organizing Your Documentation – Topics 4
137	Summary
	Maintaining and Deprecating Documentation
138	Corg.ly: A Few Releases Later
139	Maintaining Up-to-Date Documentation
142	Planning for Maintainability – Topics 3
146	Automating Documentation Maintenance – Topics 4
148	Removing Content From Your Docset – Topics 2
149	Summary

Statistics 1 and 2 (A-Level)

	Statistics (A-Level)
	S1 Statistics 1
	Exploring Data
01	Looking at the Data
02	Stem-and-Leaf Diagrams
03	Categorical or Qualitative Data
04	Numerical or Quantitative Data
05	Measures of Central Tendency
06	Frequency Distributions
07	Grouped Data
08	Measures of Spread (Variation)
09	Working with an Assumed Mean
	Representing and Interpreting Data
10	Histograms
11	Measures of Central Tendency and of Spread Using Quartiles
12	Cumulative Frequency Curves
	Probability
13	Measuring Probability
14	Estimating Probability
15	Expectation
16	The Probability of Either One Event or Another
17	Independent and Dependent Events
18	Conditional Probability
	Discrete Random Variables
19	Discrete Random Variables
20	Expectation and Variance
	Permutations and Combinations
21	Factorials
22	Permutations
23	Combinations
24	The Binomial Coefficients
25	Using Binomial Coefficients to Calculate Probabilities
	The Binomial Distribution
26	The Binomial Distribution
27	The Expectation and Variance of B(n, p)
28	Using the Binomial Distribution
	The Normal Distribution
29	Using Normal Distribution Tables
30	The Normal Curve
31	Modeling Discrete Situations
32	Using the Normal Distribution as an Approximation for the Binomial Distribution
	S2 Statistics 2
	Hypothesis Testing Using the Binomial Distribution
33	Defining Terms
34	Hypothesis Testing checklist
35	Choosing the Significance Level
36	Critical Values and Critical (rejection) Regions
37	One-Tail and Two-Tail Tests

38	Type 1 and Type 2 Errors
	The Poisson Distribution
39	The Poisson Distribution
40	Modelling with a Poisson Distribution
41	The Sum of Two or More Poisson Distributions
42	The Poisson Approximation to the Binomial Distribution
43	Using the Normal Distribution as an Approximation for the Poisson Distribution
	Continuous Random Variables
44	Probability Density Function
45	Mean and Variance
46	The Median
47	The Mode
48	The Uniform (rectangular) Distribution
	Linear Combinations of Random Variables
49	The Expectation (Mean) of a Function of X, E(g[X])
50	Expectation: Algebraic Results
51	The Sums and Differences of Independent Random Variables
52	More Than Two Independent Random Variables
	Sampling
53	Terms and Notation
54	Sampling
55	Sampling Techniques
	Hypothesis Testing and Confidence Intervals Using the Normal Distribution
56	Interpreting Sample Data Using the Normal Distribution
57	The Central Limit Theorem
58	Confidence Intervals
59	How Large a Sample Do You Need?
60	Confidence Intervals for a Proportion