

Unleash your potential and master web development.

“Currently in the editing stage. Coming very soon.”

PROGRAMMING STEP BY
STEP AND MORE
AN INSTRUCTIVE GUIDE

**LEAP INTO THE BACKEND
THE HIDDEN ENGINEERING LAYER**

A Professional Instructional Series for Modern Web Engineering.

Book 6 - Part Six

From Visual Studio Code to the
Hidden System

JavaScript as a Professional
Engineering Tool in the Era of Full
Stack and the Cloud.

Rene F. Ruano Domínguez

Copyright © 2025 René F. Ruano Domínguez
All rights reserved.

DEDICATION

TO FUTURE GENERATIONS—MILLENNIALS, BABY BOOMERS, AND BEYOND.

This Guide is dedicated to everyone: To you—the bright, young minds shaping the world with your ingenuity and creativity. To the Millennials, who navigate the digital age with fluency and constantly seek new ways to innovate. To the Baby Boomers, who pioneered the technological revolution and now contribute their experience and wisdom. And to retirees who dream of staying up-to-date, making productive use of their free time, and keeping their minds sharp.

PROLOGUE

“Currently in the editing stage. Coming very soon.”

This Book 6, titled “Book 6 – Part Six – From Visual Studio Code to the Hidden System: JavaScript as a Professional Engineering Tool in the Era of Full Stack and the Cloud,” marks a defining milestone in the “Programming Step by Step and More series”. It represents not only the culmination of a progressive educational journey but also a meaningful contribution to contemporary software development and to the modern understanding of the technologies that power today’s programming landscape.

Volume 6 establishes the transition from the visible, tangible code of the frontend to the deeper, hidden logic of the backend. It expands the learning of the language into a comprehensive vision of software engineering—one grounded in real-world systems, professional environments, and the architectural principles that sustain modern applications.

More than just another technical volume, this book is the result of a sustained journey through knowledge, practice, and critical reflection on how modern applications are built. Behind these pages lie years of study, experimentation, and systematic work with JavaScript, as well as the conviction that knowledge attains its highest value when shared with clarity, rigor, and pedagogical insight.

The author has maintained a steadfast commitment to facilitating the learning of others, translating complex concepts into accessible explanations without sacrificing technical depth. This perseverance in teaching, organizing ideas, and documenting processes is reflected in the upward trajectory of the entire series—and, most notably, in this Book 6—which is conceived as a bridge between knowledge and its professional application.

Here, an educational approach is consolidated that transcends the mere transmission of tools. The central purpose is to cultivate professional judgment: the ability to analyze problems, design coherent solutions,

structure scalable systems, and make responsible decisions within real-world development contexts.

This volume aspires to ensure that the reader not only acquires new technical competencies but also develops the mindset of a software engineer—one who is critical, methodical, creative, and committed to quality, security, and ethical technological development.

With this conviction, Book 6 of the *Programming Step by Step and More* series is presented as a guide for evolving from code to system—transforming technical knowledge into true professional competence and preparing the reader for the challenges of modern development in the era of Full Stack and the cloud.

With gratitude and admiration for the author:

Content

No.	Title	Page
—	Dedication	iii
—	Prologue	iv
—	Acknowledgments	ix
1	Introduction	1
—	First Part — Technical Foundations that Consolidate the Base	4
2	Multi User – Controlled Test: The Foundation of a Professional SaaS System	5
2.1	Installation of the Local Server	5
2.1.1	WampServer as a Local Development Environment	5
2.1.2	Step-by-Step Installation Process	6
2.1.3	User Manuals	8
2.2	Development of a Web Access Control System with a Basic and Typical Structure	8
2.3	Architecture of the Project We Will Develop	19
2.4	Parameterized Menu: Architecture, Behavior, and Usage	22
2.5	Access Control — Multi User – Controlled Test — SaaS System	23
2.5.1	Database	23
2.5.2	Tables within the <i>energyner</i> Database for Storing Records	24
2.5.2.1	<i>users</i> Table	24
2.5.2.2	LOG Table: <i>access_log</i> (Control and Auditing)	25
2.5.2.3	Table for the Controlled Test	26
2.6	Registration Form — Required Fields	28
2.7	Access (Login) Form	29
2.8	Pedagogical Substitute for CAPTCHA	29
2.9	Authentication Flow (Summary)	29
2.10	Files that Make Up the System	30
3	JSON	31
3.1	Brief Introduction	31

No.	Title	Page
3.2	Structure, Serialization, and Deserialization	32
3.2.1	Basic JSON Structure	32
3.2.2	Serialization (Object → JSON)	32
3.2.3	Deserialization (JSON → Object)	33
3.3	Importance of JSON in Modern Systems	34
3.4	JSON vs JavaScript Objects	34
3.5	JSON in APIs and Storage (Real Examples)	36
3.5.1	JSON as a Communication Language (Frontend → Backend)	36
3.5.2	How to Validate JSON Sent from the Frontend and Received by the Backend	37
3.5.2.1	Validation of JSON Received in the Backend (PHP)	37
3.5.2.2	Responses to the Frontend	39
3.5.3	Handling HTTP Status Codes in the Backend (200, 400, 500)	40
3.6	Solutions for Storing a JSON Object	42
3.6.1	Locally (localStorage)	42
3.6.2	JSON in Modern Databases	43
4	Templates	44
5	Asynchrony and Synchrony in JavaScript	44
6	Promises in JavaScript	44
7	Communication with Servers (Conceptual)	44
—	Second Part — Data and Persistence	44
8	Databases (Basic Concepts)	44
9	APIs and Frontend–Backend Communication	44
—	Third Part — Entry into the JavaScript Backend World	45
10	Node.js and Backend in JavaScript	45
11	Express.js: Backend Framework	45
12	Databases with JavaScript (Operational)	45
—	Fourth Part — Modern Architecture and Best Practices	45
13	Modern Architecture of JavaScript Applications	45

No.	Title	Page
14	Modular Architecture and Design Patterns	45
—	Fifth Part — System Quality and Reliability	46
15	Automated Testing in JavaScript	46
16	Observability and Logs	46
—	Sixth Part — Production and Deployment	46
17	Deployment and Cloud	46
—	Seventh Part — Protection and Professionalization	46
19	Security in JavaScript	47
20	Motivational Phrases	47
21	About the Author	49

ACKNOWLEDGMENTS

To my family, my colleagues, and my friends:

Thank you—a thousand thanks—for the unconditional support you have given me since I first embarked on this project. And to those who did not believe in me, I thank you for motivating me to prove that it was indeed worth the effort.

Without your encouragement, suggestions, and the trust you placed in me—along with the personal challenge of creating a useful product—this project would not have been possible.

1- INTRODUCCION

This Book 6 marks the culmination of the educational journey of the *Programming Step by Step and More* series, placing the reader within the professional territory of software engineering with JavaScript. It represents the natural transition from the visible code of the frontend to the architecture, logic, and processes that sustain the backend, articulating a coherent progression that takes the student from language mastery to the ability to design, build, deploy, and operate complete systems in real-world environments.

The content is organized into seven major parts—volumes—that follow a sequence of increasing complexity, aligned with contemporary practices in modern application development.

The First Section, dedicated to technical foundations, consolidates the student’s conceptual base: JSON as a universal exchange format, templates for dynamic rendering, and JavaScript’s asynchrony model through promises and server communication. These pillars are essential for understanding any architecture based on APIs and services.

The Second Section introduces the world of data and persistence, deepening the relationship between frontend and backend. Here, the reader learns how data is structured, validated, transmitted, and stored, establishing the bridge between the interface and information systems.

In the Third Section, the student enters the backend ecosystem with Node.js and Express. JavaScript ceases to be a language confined to the browser and becomes a full server-side platform capable of managing services, routes, business logic, and database access.

The Fourth Section raises the conceptual level by addressing modern architecture, modularity, and design patterns. This section consolidates the engineering mindset required to build maintainable, scalable, and well-structured systems.

The Fifth Section focuses on software quality and reliability: automated testing, observability, metrics, and logging. The goal is for the reader not only to build functional software but also reliable, measurable, and production-ready systems.

The Sixth Section addresses the deployment and operation of applications in the cloud. It explores deployment strategies, environment variables, basic infrastructure, and the full lifecycle of an application on the Internet.

Finally, the Seventh Section delves into code and data security, including protection techniques, obfuscation, and best practices to mitigate common risks in web and backend applications.

Each of these volumes is accompanied by real examples that do not remain theoretical: they are implemented, documented, and published on the web platform <https://energyner.net/jscript/>, which—from Books 1 through 5—has supported the reader with practical demonstrations executable online. In this way, the book and the platform form an organic Learning Management System, where the book serves as the conceptual guide, Visual Studio Code as the professional environment, the browser console as the analysis tool, and the online site as the visual validation space for the code.

From this point onward, the system incorporates a key component of professional backend development: the installation and management of a local server. With WampServer (or similar), the student reproduces on their own machine a real environment consisting of a web server, database, and server-side language, understanding the full cycle of development, testing, and deployment before publishing to the web.

In the advanced volumes, the reader will discover a multi user – controlled test architecture, the gateway to the world of SaaS (software as a service) technologies. This approach connects them with the modern commercial ecosystem, where web applications serve multiple users simultaneously, isolating data, managing records independently, and communicating in real time. It is learning that transcends the technical and prepares the student to build scalable solutions aligned with current industry standards.

From the very first exercises, the student gradually and practically enters the SaaS universe. Each activity is designed to develop real competencies, so that by the end of Book 6 they will have acquired solid mastery of this technology, increasing their professional competitiveness and preparing them to face present and future challenges, including integration with artificial intelligence.

Taken together, this Book 6 weaves fundamentals, backend, architecture, quality, deployment, and security into a unified vision of modern SaaS development with JavaScript. Upon completing it, the reader will be prepared to tackle real projects with professional judgment, systemic thinking, and a deep understanding of how contemporary applications are designed, built, and maintained in the era of Full Stack development and cloud computing.

Motivational Phrases

“Success is the sum of small efforts repeated day after day.”

— Robert Collier

“The only limit to your realization of tomorrow will be your doubts of today.”

— Franklin D. Roosevelt

“It does not matter how slowly you go as long as you do not stop.”

— Confucius

“The road to success and greatness lies in developing what you already have.”

— Zig Ziglar

“The secret of success lies in knowing something that others do not.”

— Aristotle Onassis

“It’s not about how many times you fall, but how many times you get back up.”

— Vince Lombardi

“Success is not the key to happiness. Happiness is the key to success. If you love what you do, you will succeed.”

— Albert Schweitzer

“The only way to do great work is to love what you do.”

— Steve Jobs

“The biggest risk is not taking any risk. In a world that changes really fast, the only strategy guaranteed to fail is not taking risks.”

— Mark Zuckerberg

“Motivation gets us started, but habit is what keeps us going.”

— Jim Ryun

“It is not enough to tell the truth; one must also show that one possesses it.”

— Baltasar Gracián

“If you can’t fly, run; if you can’t run, walk; if you can’t walk, crawl but keep moving toward your goal.”

— Martin Luther King Jr.

“No matter your physical age, you can always motivate your mind to face tomorrow.”

— The Author

ABOUT THE AUTHOR

After several decades dedicated to improving the energy efficiency of heating and cooling equipment and systems, I faced a major life change: retirement. Upon retiring, I felt disoriented and without a sense of purpose, which affected my emotional well-being. To overcome this feeling, I sought a new activity that would keep me active and motivated.

I decided to share the experiences and knowledge accumulated over more than forty years of work in the industry. This project was born with the goal of publishing articles, calculation tools, and instructional materials covering the various disciplines I worked with throughout my engineering career. My technical and computing skills were developed independently, deepening my understanding of theoretical and practical topics. This includes web programming, which I used as a complementary tool to optimize project management, investments, finance, and marketing.

Through lived experience, I have come to understand that web programming is a powerful tool for solving complex problems in industrial environments, technical services, and everyday life.

My new outlook on the future—centered on the ongoing revolution of digitalization—has been essential for keeping my mind active, staying up to date, and learning new technologies through hands-on practice. In this context of constant and accelerated change, my perspective expands toward a horizon where AI not only optimizes processes but also reshapes industries and creates unimaginable opportunities.

This instructional guide highlights the importance of programming languages as essential tools in the modern world and is designed to support people of all ages in developing their professional skills and achieving their career goals. It provides valuable resources both for those beginning their journey and for those seeking new ways to apply their experience.

The Author