CASE STUDY

Semtrol E-CF API - Electronic Invoicing & Fiscal Integration Platform

Fiscal integration layer for ERP, POS and business systems that need to generate, validate, sign, submit and track electronic fiscal documents.

Context Electronic invoicing and fiscal integration for business systems.	**Core stack** C#, ASP.NET Core, SQL Server, REST APIs, XML, XSD and digital certificates.
Focus XML generation, XSD validation, digital signature, QR/security code handling and external fiscal service integration.	**Value** Centralized fiscal logic, traceability, lower rejection risk and operational continuity.

Context

Semtrol E-CF API is an electronic invoicing and fiscal integration platform developed to connect ERP, POS and internal business systems with external tax authority services and regulated electronic document workflows.

The solution was designed for companies that need to generate, validate, digitally sign, send, track and manage electronic fiscal documents while keeping their business operations running reliably.

Business Problem

Companies that issue fiscal documents must comply with strict electronic invoicing rules, technical validations and external tax authority requirements. A failure in this process can directly affect invoicing, cash flow and daily operations.

- Invoices must follow specific XML structures and field rules;
- fiscal document types may require different validation logic;
- data must be validated before submission;
- documents must be digitally signed;
- QR codes and security codes must be generated correctly;
- external fiscal services must be integrated reliably;
- errors can block invoicing operations;
- ERP and POS systems need a clean integration layer for fiscal logic;
- companies need traceability of accepted, rejected, pending or corrected documents.

Solution

I developed Semtrol E-CF API as a centralized fiscal integration layer for electronic invoicing. The API allows ERP, POS and business systems to generate and process electronic fiscal documents through a controlled, reusable and traceable architecture.

- Fiscal document generation;

- XML creation;
- XSD validation;
- digital signature workflows;
- QR and security code handling;
- communication with external fiscal services;
- response and status tracking;
- error handling and resend workflows;
- integration with ERP and POS systems;
- support for multiple fiscal document types.

Core Capabilities

Electronic Fiscal Document Generation

The platform generates electronic fiscal documents based on business transaction data coming from ERP, POS or internal systems.

XML Generation

The API builds XML documents following the required fiscal structure, field order, formatting rules and document-specific requirements.

XSD Validation

Before sending documents externally, the XML is validated against the corresponding XSD schema to reduce rejection risks.

Digital Signature

The platform signs electronic documents using digital certificates, enabling fiscal validity and secure document submission.

QR Code and Security Code Handling

The system prepares QR-related data and extracts or generates security codes required for document consultation and validation.

External Fiscal Service Integration

The API communicates with external tax authority services to submit documents, receive responses and track processing status.

Response and Status Tracking

The platform tracks accepted, rejected, pending or correction-required documents, helping companies maintain visibility over fiscal operations.

Error Handling and Retry Logic

The system supports controlled error handling and resend workflows to reduce operational disruption when external services fail or documents need correction.

ERP / POS Integration

The API acts as a reusable fiscal layer for business systems, allowing ERP, POS and operational platforms to consume electronic invoicing capabilities without duplicating fiscal logic.

Technical Workflow

- The ERP, POS or business system creates a transaction;
- transaction data is sent to Semtrol E-CF API;
- the API maps business data into the required fiscal structure;
- XML is generated according to the document type;
- the XML is validated against the corresponding XSD;
- the document is digitally signed;
- security and QR-related data are prepared;
- the document is sent to the external fiscal service;

- the response is received and stored;
- the business system is updated with the result;
- if required, the document can be corrected, resent or tracked.

Technical Scope

The project involved backend development, fiscal rule implementation, XML handling, schema validation, certificate-based signing, API design, database persistence, error handling and integration with existing business systems.

- API design and implementation;
- electronic document structure mapping;
- XML generation;
- XSD validation;
- digital certificate handling;
- fiscal document signing;
- QR/security code processing;
- external API communication;
- document status tracking;
- SQL Server persistence;
- ERP/POS integration;
- production support and fiscal rule maintenance.

Technologies Used

C#, ASP.NET Core, .NET, SQL Server, REST APIs, XML, XSD, JSON, digital certificates, electronic signatures, QR code generation, fiscal service integrations, background processing, error handling, logging and ERP/POS integration.

Business Value

- Reduced manual fiscal processing;
- better compliance with electronic invoicing requirements;
- fewer document rejection risks;
- centralized fiscal logic;
- reusable API layer for ERP and POS systems;
- better traceability of fiscal documents;
- faster integration of business systems with tax authority services;
- improved operational continuity;
- clearer visibility over accepted, rejected or pending documents;
- foundation for future fiscal automation and reporting.

Why This Project Matters

Semtrol E-CF API demonstrates experience building regulated business integrations where technical accuracy, compliance, reliability and traceability are critical.

This project combines business software integration, fiscal compliance requirements, XML/XSD processing, digital signature workflows, external service communication, SQL Server persistence, API architecture, production support, error handling and ERP/POS integration.

It is a strong example of my ability to build business-critical integration platforms that connect operational systems with external regulatory services.

More about my work: v2garcia.dev
Contact: garcia.vm@hotmail.com