

# BillingSystem Case Study (Simple Billing System)

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*The BillingSystem case study is defined to demonstrate the ITLingoCloud platform, with particular emphasis on its ITLingo-Chatbot and ITOI components. The following text provides an informal description of a fictitious information system used to elicit, specify, validate, and refine its requirements in a more consistent and systematic way.*

## Summary

BillingSystem is a simple information system that supports the complete billing lifecycle, including managing users, customers, products, invoices, and payments. Operators prepare invoices, managers approve or reject them, and administrators manage users and configure the system. Once approved, invoices can be issued, sent to customers, monitored for payment, and archived in accordance with the applicable retention rules. The system automatically identifies overdue invoices, provides operational and management reports, and periodically exports accounting information to an external ERP system. It also ensures role-based access control, data protection, secure communications, auditability, and non-repudiation. Designed for organizations operating in different countries, BillingSystem supports configurable fiscal rules, VAT rates, languages, currencies, and document templates. The solution is expected to be secure, intuitive, available during business hours, and scalable for commercial use across European markets.

## Purpose and Scope

BillingSystem is a simple information system designed to support the management of customers, products, invoices, payments, and related accounting information. It is intended for organizations that need a configurable and easy-to-use solution for preparing, approving, issuing, sending, and monitoring invoices.

The system supports the complete billing lifecycle, from the registration of customers and products to invoice preparation, approval, issuance, delivery, payment monitoring, reporting, archiving, and export to an external accounting system.

## Key Users and Functional Requirements

### Users, Roles, and Access

BillingSystem is used by registered users. Each user has an account and may be assigned one or more roles, including operator, manager, and administrator. Administrators manage users, roles, and system configuration; operators manage customers, products, invoices, and payments; and managers supervise billing activities, approve or reject invoices, and consult management reports.

All users can log in and log out, consult and update their personal information, change their passwords, and recover forgotten credentials. Password recovery is performed through a secure link sent to the user's registered email address. Access to functionality and information is determined by the roles assigned to each user.

## User and System Administration

Administrators are responsible for registering and managing users. When registering a new user, an administrator enters the person's first name, last name, email address and username and assigns the appropriate roles. The system generates an initial password and securely sends it to the registered email address. The user is expected to change this password after the first login. Administrators can subsequently update user information, modify role assignments, activate or deactivate accounts, and initiate password resets.

Administrators also configure general system parameters, including company information, user roles, invoice numbering rules, VAT categories, discount policies, document templates, export settings and integration options.

## Customer Management

Operators are responsible for creating and updating customer information. For each customer, BillingSystem stores the name, fiscal identification number, logo, one or more addresses, bank details, email addresses, telephone numbers, contact persons, and other relevant information.

A customer may be classified as a VIP customer. Invoices for VIP customers may receive a predefined discount under the company policy in effect at the time. Because the applicable discount policy may change, the system records the discount effectively applied to each invoice. Subsequent policy changes must not alter previously issued invoices.

## Product and VAT Management

Operators can register and update the products and services used in invoices. For each product, the system stores its name, description, price, and applicable VAT information. Each product is associated with one VAT category at a given time, and the system maintains the current VAT rate for that category. However, it must also preserve the price and VAT rate applied to each previously issued invoice. Changes to product prices or VAT rates therefore affect only new invoices and must not modify historical billing information.

## Invoice Preparation

Invoice preparation is a collaborative process involving operators and managers. An operator creates an invoice for a selected customer and adds one or more invoice lines. Each line identifies a product or service and records its description, supplied quantity, unit price, applicable VAT rate, discount, and resulting amounts. The system automatically calculates the net amount, tax amount, and total amount of each line, as well as the overall invoice totals.

A newly created invoice initially remains in the draft state. While it is in this state, the operator can modify or cancel it. When the invoice is complete, the operator submits it for managerial approval.

## Invoice Approval and Issuance

A manager reviews each submitted invoice and decides whether to approve or reject it. A rejected invoice is returned for correction and may subsequently be resubmitted.

An approved invoice can be formally issued by an operator. During issuance, the system assigns its definitive invoice number and issue date. After issuance, the invoice can be sent electronically to the customer by email and, when required, by regular post.

An invoice cannot be issued or sent before it has been formally approved. The system records the user responsible for each submission, approval, rejection, and issuance, together with the corresponding date and time.

## Invoice Lifecycle

BillingSystem tracks each invoice throughout its lifecycle. An invoice begins in the draft state while it is being prepared. It enters the submitted state when it is sent for managerial review. The manager may then move it to the approved or rejected state. A rejected invoice may be corrected and resubmitted, whereas an approved invoice may be formally issued. An issued invoice moves to the paid state after its payment has been registered and confirmed. When an invoice is no longer operationally active and satisfies the applicable retention rules, it may enter the archived state.

The system enforces the permitted transitions between these states. For example, only a submitted invoice can be approved or rejected, and only an approved invoice can be issued. Archived invoices remain available for legal, accounting, and auditing purposes but cannot be modified through normal operational procedures.

## Payment and Overdue-Invoice Monitoring

Operators register payment information for issued invoices. The system associates each payment with its corresponding invoice and updates the invoice to the paid state after the payment is confirmed. If an issued invoice remains unpaid for more than 30 days after its issue date, the system automatically generates an alert for the responsible manager. The alert remains active until the invoice is paid or otherwise resolved.

Managers can monitor unpaid and overdue invoices and identify the customers, amounts, issue dates, and due dates involved. Relevant actions concerning payments and overdue invoices are recorded for subsequent consultation and auditing.

## Monitoring and Reporting

Managers supervise billing operations and monitor the creation, submission, approval, rejection, issuance, delivery, and payment of invoices. BillingSystem provides operational and management reports covering invoices by customer, product, status, period, and year. Managers can also consult information about approved and rejected invoices, issued and paid amounts, unpaid and overdue invoices, active alerts, and aggregated VAT values. Reports should support appropriate filtering and export to commonly used formats.

## Accounting Integration

BillingSystem periodically transfers relevant invoice information to an external ERP-Accounting System. Under normal operating conditions, issued and paid invoices are transferred monthly through a web service provided by that system.

BillingSystem records the result of every transfer so that users can distinguish successfully exported invoices from failed operations. Failed transfers can be analyzed and retried without creating duplicate accounting records. The integration must also ensure that the information received by the ERP-Accounting System remains consistent with the invoices stored in BillingSystem.

## Archiving and Retention

Paid and rejected invoices more than one year old are archived in accordance with the organization's retention policy. Archiving removes these invoices from normal operational activities while preserving the information required for accounting, auditing, and reporting.

Archived invoices remain available to authorised users but cannot be modified through regular billing operations. The system records when an invoice was archived and whether it had previously been exported to the ERP-Accounting System.

## Other Requirements and Constraints

### Security, Privacy, and Auditability

Privacy, security, and accountability are fundamental concerns of BillingSystem. Personal, commercial, and financial information must be protected both when stored and when transmitted.

Access to functionality and information is controlled according to user roles and the principle of least privilege. Users should access only the information and operations required to perform their responsibilities. Passwords are never stored in readable form and must be securely hashed and salted. Communication with users and external systems must use secure channels that protect confidentiality, integrity, and authenticity.

The system maintains an audit trail of relevant user actions and system events. These records cover user and role management, changes to customer and product information, invoice submission, approval, rejection, issuance and delivery, payment registration and confirmation, archiving and transfers to the ERP-Accounting System.

BillingSystem must also provide sufficient evidence of invoice approval and issuance to support non-repudiation. An authorized user should not be able to credibly deny an approval, rejection or issuance action that they performed.

### Usability and User Experience

BillingSystem should be intuitive and require minimal training. Operators and managers should be able to perform their regular tasks without repeatedly consulting a user manual.

A new operator should be able to prepare an invoice in approximately three minutes. A manager should be able to locate and approve a pending invoice in approximately two minutes, while the complete preparation, approval and issuance process should take approximately six minutes. An administrator should normally be able to register a new user within five minutes.

The interface should be consistent with the external ERP-Accounting System already known to the intended users. Fields with a limited set of valid values should provide selection lists or equivalent controls.

Invoice states should be immediately recognizable. For example, rejected invoices may be shown in red, unpaid invoices in yellow and paid invoices in green. However, textual labels or icons must also be used so that status recognition does not depend exclusively on color.

While an operation is still in progress, users should be able to cancel it or correct the entered information whenever the applicable business and legal rules permit.

### Availability and Performance

BillingSystem is expected to be available for at least 15 hours on working days. Planned maintenance should take place during weekends or outside normal office hours.

Under normal operating conditions, login requests should be processed within 30 seconds and user-registration requests within 60 seconds. An issued invoice should be emailed to the customer within one hour. After a payment has been registered and confirmed, the corresponding invoice status should be updated within one working day.

The system should support the expected number of simultaneous users without significant degradation of its normal response times.

## Configurability and Internationalization

BillingSystem is intended for commercialization in several countries, particularly within the European Union. It must therefore support multiple languages and make it straightforward to add new language packs, configure country-specific parameters and deploy remote updates.

Fiscal rules, VAT categories, currencies, company information, discount policies, invoice numbering conventions, date and number formats, document templates and export settings should be configurable without requiring changes to the system's core implementation.

## Project and Technical Context

BillingSystem is owned by MySoftwareHouse, the organization responsible for its development, maintenance, and future commercialization. TheCustomer acts as the pilot organization and uses the system during its initial development and evaluation.

The project follows Scrum as its agile management and development approach. The initial technical solution is based on PostgreSQL and ASP.NET Core, although the functional description is intended to remain sufficiently independent of any particular technology.

Following the release and validation of version 1.0, MySoftwareHouse intends to scale the solution to more than 500 customer organizations in its domestic market and approximately 1,000 organizations across the European Union.