1Software Requirement Specification

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1. Project Description

Our program is a Medical Bill Translator & Negotiator that helps patients better understand their medical bills. It will allow users to upload a bill, translate medical codes into plain language, and flag common errors such as duplicates or overcharges. The system will also provide a negotiation template to help patients dispute or reduce charges.

2. Functional Requirements

FR01	User uploads medical bill in an acceptable format file. (PNG, JPEG, or PDF), system scans and parses the data into a data structure
FR02	User uploads medical bill text, system parses the data into a data structure
FR03	As a failsafe, if the parser parses the bill incorrectly the user should be able to manually correct it.
FR04	The user uploads the medical bill, and the system reads the user's medical bill and flags potential erroneous charges, then generates a report.
FR05	User requests download of system report, system generates downloadable file and processes download request
FR06	User requests emailed copy of system report, system requests email and sends report
FR07	User requests a template letter to send to medical provider representing information on report, system takes report information and inserts it into a set template generating the letter
FR08	The software must enable users to view flagged potential erroneous or duplicate charges in their medical bill, with a summary report.
FR09	System administrators upload a system medical code database update, the system should implement that update to all users.
FR10	The software must enable users to highlight specific charges in the report for closer review or notes before printing or generating letters
FR11	System puts report into memory to keep track of user's medical bill report history
FR12	After the user uploads the medical bill, the user will be able to access a comparison of user's costs to average cost of uninsured patients and flags higher charges
FR13	System allows user to search for keywords in report for easy access
FR14	The user must check a box to accept the disclaimer pop up in order to export report or letter
FR15	User can look through their medical bill report history in system and compare multiple reports side by side

3. Non-Functional Requirements

NFR01	System should parse average-sized (5-10 MB PDF, image, or plain text) medical bill and generate report within 10 seconds
NFR02	The software must render pages and process bill uploads without noticeable lag (UI response < 1 second) on Chrome, Firefox, Safari, and Edge.
NFR03	System should be encoded in English language
NFR04	Medical codes must be updated annually according to American Medical Association within 30 days of its annual release
NFR05	System UI interactions should be processed within 1 second
NFR06	The software must enable at least 90% of new users to upload a bill and generate a report successfully without prior training.
NFR07	System should send the requested email reports within 15 minutes of the request
NFR08	Uploaded files must be removed from memory immediately after report generation and verified within 1 second.
NFR09	System should display an error message if the user uploads an incorrect file type
NFR10	The software must correctly render all UI components on screen widths between 320px (mobile) and 1920px (desktop) without horizontal scrolling or clipping.
NFR11	The software must comply with WCAG 2.1 AA standards, including screen reader compatibility, keyboard navigation, and color contrast ratios ≥ 4.5:1.
NFR12	System should display instructions to guide users through each step of the process
NFR13	System should display a legal disclaimer within 5 seconds of the page loading

4. Use Case Specification

UC01 Name:	Upload and Parse Medical Bill
Description:	The software allows the patient to upload a medical bill in text or image format. The system extracts and parses the data into a structured table for further analysis.
Actor:	Patient
Entry condition:	The actor loads the homepage
Basic path:	1. The system presents the home screen with the options of: **[PRO01]** 　1.1. Upload File (PNG, JPEG, PDF) 　1.2. Manual Text Input 2. Actor selects an option: **Upload File [A01] [PRO02a]** 3. The system presents the **Upload File** page **[A02]** 　3.1. Choose File - triggers a file selector 　3.2. Cancel - returns to home screen **[A02]** 4. The actor chooses a file and clicks **Upload [A02]** 5. The system verifies 　5.1. File path exists 　5.2. File type is accepted **[BR01] [E01]** 　5.3. File size is within limits **[BR02] [E02]** 6. The system attempts to parse the file **[E03]** 　6.1. Extracts readable text 　6.2. Structures data into rows and columns 7. Displays the parsed table on-screen **[PRO03]** 　7.1. Select (checkbox) 　7.2. Code (medical code) 　7.3. Description (plain language) 　7.4. Charge (currency) 　7.5. Date (service date) 　7.6. Highlighted rows indicate potential errors/duplicates 8. The actor reviews the table, selects which rows to include in the report.

	9. The system prepares the parsed data for translation **(UC02)** and displays the button: **"Translate Codes & Generate Report."** 10. The use case is concluded

Alternative paths:	**[A01] Actor selects manual text input [PRO02b] [A02]**
	1. The system presents a screen with the following:
	    1.1. Text area appears for pasting or typing bill
	    1.2. Continue button
	    1.3. Cancel → returns to home The actor types or pastes medical bill text into the text area
	2. The actor pastes or types medical bill data into text box
	3. The actor selects the continue button **[A02] [E04] [BR04]**
	4. The use case returns to step 6 of the basic path
	
	[A02] Actor cancels upload
	1. The use case is concluded.
	2. The system returns to the home screen.

Exception paths:	**[E01] Invalid file type**
	1. System displays message indicating unsupported file type.
	2. The use case returns to step 1 of the basic path.
	
	[E02] Invalid file size
	1. System displays message indicating the file is either too small or too large.
	2. The use case returns to step 1 of the basic path.
	[E03] Parsing error
	1. System displays message indicating parsing failed.
	2. The actor is prompted to:
	    2.1. Manually correct the bill data
	    2.2. Reupload a file, which returns to step 3 of basic path
	    2.3. Cancel upload, which returns to step 1 of basic path **[A02]**
	[E04] Input text error

	1. System displays a message indicating the text input field is empty or oversized
	2. The continue button is disabled, until text is edited to fit within [BR04]
	3. The actor is prompted to:
	    3.1. Continue
	    3.2. Cancel
	4. The actor selects continue **[A02]**
	5. The use case returns to step 6 of the basic path

Business Rules:	**[BR01]** Only accepted file types (PNG, JPEG, PDF, TXT) can be uploaded **[BR02]** File size must not exceed 10 MB **[BR03]** Parsed data remains in memory only until translation or user exit **[BR04]** Input text field must be larger than 0 bytes, and less than 2MB
Data description	**Files** | Name	Type	Length	Mask | |---|---|---|---| | File size | File | < 10 MB | – | | Parsed Table | Table | < 500 rows | – | **Text Input** | Name	Type	Size | |---|---|---| | Input Text Box | Plain text | 2MB | **Parse Bill Table** | Column	Type	Example / Notes | |---|---|---| | Select | Checkbox | Allows actor to select items | | Code | Text | Medical billing code (e.g., 99213) | | Description | Text | Plain-language description | | Charge | Currency | Cost of service (e.g., $150) |

	Data	Date	Service date (e.g., 03/21)

Prototype:	**[PRO01] Home Page – Upload Options** Medical Bill Translator Upload your medical bill, select an option Upload File (PNG, JPEG, PDF) Manual Text Input Max file size: 10 MB **[PRO02] Upload Window** **A)**

Upload Medical Bill

Choose a file to upload

Browse / Choose File

File Selected: _____

Upload   Cancel

Max file size: 10 MB

B)

Enter Medical Bill Manually

Paste or type your medical bill below:

[Text Area]

Continue   Cancel

[PRO03] Parsed Bill Table

Parsed Medical Bill Table

File: [filename.pdf]

Select	Code	Description	Charge	Date
☐	XXXXX	-----------	$__.__	MM/DD/YY
☐	XXXXX	-----------	$__.__	MM/DD/YY
☐	XXXXX	-----------	$__.__	MM/DD/YY
☐	XXXXX	-----------	$__.__	MM/DD/YY
☐	XXXXX	-----------	$__.__	MM/DD/YY

Next: [Translate Codes & Generate Report]

UC02 Name:	Translate Codes and Generate Report
Description:	The system converts medical codes from the uploaded bill into plain-language descriptions and displays the results clearly for the user to review.
Actor:	Patient
Entry condition:	The actor selects the option to "**Translate Codes & Generate Report**"

Basic path:	1. The system reads the selected, parsed medical codes from the bill from [**UC01**]
	 2. The system matches codes against the internal database **[E01] [BR01]**
	 3. The system translates the codes into plain language **[BR01]**
	 4. The system checks for duplicate charges and billing errors **[BR02]**
	 5. The system compiles a results report containing:
	    5.1. Original code and description
	    5.2. Plain language translation
	    5.3. Original charge
	    5.4. Mistake flags
	 6. The system displays a report in a table view with a filter option and a summary. **[A01] [BR03] [PRO01] [PRO02]**
	 7. The system displays a button to generate a template letter using filters.
	 8. The use case is concluded.

Alternative paths:	**[A01] Actor filters report**
	 1. The system returns the report, the actor can filter results to show only: **[PRO02]**
	    1.1. Flagged duplicates
	    1.2. Descriptions
	    1.3. Charge
	 2. The system filters according to the filters selected
	 3. The use case returns to step 7 of the basic path.

Exception paths:	**[E01] No matching code** 1. The system is unable to match the billing code to the database 2. The system flags the codes as "Not Found" 3. Ignores processing from steps 3 and 4 of basic path 4. The system inputs the line item with flag into report 5. The use case returns to step 5 of the basic path.
Business Rules:	**[BR01]** The system is maintained to contain an up-to-date medical code to English description database **[BR02]** The system's internal database is maintained to contain common billing error fields that can be searched and checked, such as mismatched codes, dates, and duplicate providers. **[BR03]** Report view is read-only
Data description	*(table below)*
Prototype:	**[PRO01] Translation Report Page**

Name	Type	Length	Notes
Medical Code	String	≤10 char	Original medical code
Description	String	≤150 char	Original description from bill
Translated Text	String	≤125 char	Plain-language translation
Charge	Currency		Cost of service
Flag Message	String	≤125 char	Duplicates, errors, or "Not Found"

Patient Report

Filter   +

Report:

Medical Codes	Plain Language Description	Charges	Flags
XXXXXXXXXX	---	$__.__	-----
XXXXXXXXXX	---	$__.__	-----
XXXXXXXXXX	---	$__.__	-----
XXXXXXXXXX	---	$__.__	-----
XXXXXXXXXX	---	$__.__	-----
XXXXXXXXXX	---	$__.__	-----
XXXXXXXXXX	---	$__.__	-----
XXXXXXXXXX	---	$__.__	-----
XXXXXXXXXX	---	$__.__	-----

Summary:

[PRO02] Filter Options

Patient Report Filters

Filter   –
Flags
Descriptions
Charges

Report:

Medical Codes	Plain Language Description	Charges	Flags
XXXXXXXXXX	---	$__.__	-----
XXXXXXXXXX	---	$__.__	-----
XXXXXXXXXX	---	$__.__	-----
XXXXXXXXXX	---	$__.__	-----
XXXXXXXXXX	---	$__.__	-----
XXXXXXXXXX	---	$__.__	-----
XXXXXXXXXX	---	$__.__	-----
XXXXXXXXXX	---	$__.__	-----
XXXXXXXXXX	---	$__.__	-----

Summary:

Generate Letter

UC03 Name:	Generate Negotiation Template
Description:	The system generates an editable negotiation letter based on the flagged codes, allowing the patient to dispute or request an itemized bill.
Actor:	Patient
Entry condition:	The actor selects Generate Letter on the results page.

Basic path:	1. The system provides the following templates: **[PRO01]**
	    1.1. Dispute Duplicate Charge
	    1.2. Request Itemized Bill **[A01]**
	    1.3. General Inquiry Letter **[A02]**
	2. The actor selects "**Dispute Duplicate Charge**". **[A01] [A02]**
	3. The system auto fills the template fields with relevant data **[BR01]**
	4. The system will display the following options: **[A03] [PRO02]**
	    4.1. Download as PDF
	    4.2. Copy to Clipboard
	    4.3. Edit Template
	5. The actor selects Copy to Clipboard **[A03] [A04] [BR04]**
	6. The system triggers the browser to copy data to actor's system
	7. The use case is concluded.

Alternative paths:	**[A01] Actor selects Request Itemized Bill** 1. The system auto-fills Itemized Bill template fields with relevant data **[BR01] [BR02]** 2. Return to step 4 of the basic path. **[A02] Actor selects General Inquiry Letter** 1. The system auto-fills Itemized Bill template fields with relevant data **[BR01] [BR03]** 2. The actor may edit and confirm changes. Return to Step 4 of the basic path. **[A03] Actor chooses to edit the template** 1. The actor selects the option to edit the template letter. 2. The actor modifies the template as desired. **[E01]** 3. The actor selects the option to confirm edits. Return to step 4 of the basic path.

	[A04] Actor selects download as PDF 1. The system generates a PDF version of the customized negotiation letter. **[BR04]** 2. If the PDF generation is successful, the system prompts the actor to save or open the file. **[E02]** 3. The system performs the browser actions required to download the PDF 4. The use case continues to step 7 of the basic path.
Exception paths:	**[E01] Actor makes invalid changes to the letter** 1. The actor's changes to the template letter are either above the character limit or empty. 2. The system displays the message: "These changes are invalid." 3. The system will revert the actor's changes to the dispute letter. Return to step 4 of the basic path. **[E02] PDF generation fails** 1. If an error occurs during PDF generation, the system displays an error. 2. The actor may retry the download. Return to step 4 of basic path
Business Rules:	**[BR01]** The relevant data for inputting into the template letter includes the line code, date, flag message, and charge mount from the report of **[UC02]** **[BR02]** There is a specifically formatted Itemized Bill template

	[BR03] There is a specifically formatted General Inquiry Letter template **[BR04]** The system must not store generated letters.
Data description	<table><tr><td>**Name**</td><td>**Type**</td><td>**Length**</td><td>**Mask**</td></tr><tr><td>Template Type</td><td>Enum</td><td>–</td><td>Dispute | Itemized | General Inquiry</td></tr><tr><td>Medical Code</td><td>String</td><td>≤10 char</td><td>–</td></tr><tr><td>Dispute Description</td><td>String</td><td>≤350 char</td><td>–</td></tr><tr><td>Export Choice</td><td>Enum</td><td>–</td><td>Download PDF | Copy</td></tr></table>
Prototype:	**[PRO01]** **[PRO02]**

Export Template Letter

Below is your automatically generated letter.
Review the contents before exporting/editing.

Provider Address
City, State, #####
Date

Dear Sir or Madam,
Lorem ipsum dolor sit amet, consectetur adipiscing elit. Integer nec odio. Praesent libero. Sed cursus ante dapibus diam. Sed nisi. Nulla quis sem at nibh elementum imperdiet. Duis sagittis ipsum. Praesent mauris.

CODE   DATE   FLAG MESSAGE   CHARGE AMOUNT
CODE   DATE   FLAG MESSAGE   CHARGE AMOUNT

Curabitur tortor. Pellentesque nibh. Aenean quam. In scelerisque sem at dolor. Maecenas mattis. Sed convallis tristique sem. Proin ut ligula vel nunc egestas porttitor.

Sincerely,
Actor Name

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