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ePCR System

Team #27

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Abstract
The ePCR system is a web and mobile patient record tracking and entry system designed for use by the San Carlos Rescue ambulance service in Sonora Mexico. The project is significant for the Rescate ambulance service as it is replacing their current method of handwritten records. The major features include a secure environment logging patient records, accessing records with ease, running trend call analysis on the reports, and an intuitive design supporting English and Spanish. The system has the potential to have an impact on healthcare in lower income regions. This project will be open source to benefit as many healthcare providers as possible. This document will outline project updates, testing strategies and testing criteria.

Project Updates and Changes

Major developments have been made to the ePCR system. The settings page has been created to support normal and admin users. The settings page provides an interface for any user to change their account information. The settings page provides a button for any user to delete their account. Admin users have more functionalities on the settings page. Admin users are presented with an additional interface to add/delete users and elevate the privileges of users in the system. Alongside the frontend, the backend to compliment the settings was completed as well. An additional development made was integrating the system with a multilingual feature. A user can toggle the website to change the language between English and Spanish. A view charts/search charts page was added. The pages allow the user to view all the charts in the system and search the charts in the system. Another development made was the functionality to add a note to a chart. The feature allows additional information to be added to a chart as charts are immutable. The physical assessment portion of the charts page was completed.

A major change occurred with the table schema used in the charts page. The column names were refactored and the architecture altered. The column names were refactored to allow the database to be more readable. With column names that represent the data accurately, the table became more clear. A change was made to numerous columns to reduce complexity. Previously, multiple parameters were being stored in single columns with the “|” symbol used as a separator. This was changed by putting everything in its own column. With some columns being combined into one, added complexity was being applied to the schema. A change was made to the project specifications. Our project sponsor, Mr. Bryan Pond, informed us that multiple procedures can be added to a single chart. The change in specifications led us to creating a separate database table for procedures that is linked to the charts table.

User Stories and Acceptance Criteria

Table 1: The user stories and acceptance criteria are listed for five subsystems: authentication, login, registration, charts, and multilingual.

Subsystem	User Story
User Authentication/ Authorization	● As a normal user, I wish to be able to access any page related to: my account; my patients; my charts. Acceptance Criteria: ○ AC1. A normal user will be able to access their authorized page from the token received upon login. ● As an admin user, I wish to be able to access any and all pages of the service, including those pertaining to new account creation and management. Acceptance Criteria: ○ AC1. An admin user will be able to access all pages from the token received upon login.
Login	● As any user, I wish to only have to login once per session. Acceptance Criteria: ○ AC1. Any user can login and receive a token for their session. ● As any user, I wish to log in to my account and be redirected to the dashboard. If I enter something wrong, I want to receive a message saying so. Acceptance Criteria: ○ AC1. Any user can enter their account information and log in to access the service.
Registration	● As any user, I want to be able to register for the system so that I can login to the application. Acceptance Criteria: ○ AC1. A status message is displayed showing if the registration was successful or not. ○ AC2. The user's credentials are added to the database upon success. ○ AC3. User may login upon successful registration. ● As any user, I want to be able to toggle to the login page from the registration page. Acceptance Criteria: ○ AC1. The login page is displayed. ○ AC2. User may enter their credentials to login.
Chart Creation/View/ Search	● As any user, I want to create and fill out the chart for my patient. It should ask me the incident details, the patient demographics, the physical assessment, the vitals and treatment, etc. Acceptance Criteria: ○ AC1. Any user clicks on the "charts" tab of the sidebar and can create a chart for their patient. ○ AC2. When the user clicks the "next" and "previous" buttons or through the chart navigation at the bottom, the page will ask the user specifically for the incident, patient,

	assessment, treatments, etc. ● As any user, I want to be able to access an existing patient's information and use that on a new patient chart. Acceptance Criteria: ○ AC1. Any user clicks on the "charts" tab of the sidebar and can navigate to the "patient" section and search for an existing patient. ○ AC2. After a patient is found, the patient's information will be populated onto the fields. ● As any user, I want to be able to view a chart's details in full if I was to go through them. Acceptance Criteria: ○ AC1. Any user selects a chart on the "view charts" page. This will allow the user to see the contents of that chart. ○ AC2. The user cannot edit the chart, but certain sections of the chart can be edited, such as "notes". ● As any user, I want to be able to generate a PDF or print the chart report. Acceptance Criteria: ○ AC1. Any user selects a chart on the "view charts" page. This will allow the user to see the contents of that chart. ○ AC2. If the user presses CTRL+P or click on an icon that says "generate a PDF", the print screen will pop up. ○ AC3. The user clicks on download as PDF or print, the chart should be saved to the computer or be sent to the printer. ● As any user, on the "view charts" page, I want to add an addendum, or "note", to the chart to include additional information that was not included on the original chart. Acceptance Criteria: ○ AC1. When any user navigates to a chart page and scrolls to the bottom, a textarea field labeled notes will be displayed. ○ AC2. The user types a note into the textbox and hits submit. That note should be added to the notes listed below the chart. ● As any user, on the "view charts" page, I want to see notes that other users have added to that chart to see what additional information they have added to the chart. The notes that I can view should be time stamped and should indicate who authored that note. Acceptance Criteria: ○ AC1. When any user navigates to a chart page, the user should be able to see all the notes that have been added to the chart at the bottom. ○ AC2. All notes should be time stamped and show who authored the note. ● As any user, on the "view charts" page, I want to search charts by first name, last name, and DOB to view all charts that match the specified search criteria. Acceptance Criteria: ○ AC1. Any user navigates to the "view charts" page and can

	enter a first name, last name, or DOB into the respective search fields. ○ AC2. When the user clicks the search button, the page should only show previews that meet the search criteria specified. ● As any user, on the "view charts" page, I want to filter charts by date range to see all the charts added within the specified date range. Acceptance Criteria: ○ AC1. Any user navigates to the "view charts" page and can enter a start date and an end date into the start date field and end date field respectively. ○ AC2. When the user clicks "search", the user should see all the charts that were added within the date range specified.
Multilingual	● As any user, I want to change the language from English to Spanish so that I can view all non-user generated content on the page in my native language. Acceptance Criteria: ○ AC1. Any user can click on their profile name/picture in the top right. That will cause a small settings pop-up to appear, asking to select their language. ○ AC2. When the user clicks on another language, all non-user generated content should switch to the language selected. ● As any user, I want to select my language at login to show the website in my native language after login is complete. Acceptance Criteria: ○ AC1. When any user navigates to the login screen there should be a drop down to select a language. ○ AC2. When a language is selected, the login page and all other pages should be switched to the user's preferred language.

Testing Workflow

Happy Path

Table 2: The happy path shows the workflow where the system is working and the user follows along what happens in the path.

Path Title	Path Description
Chart is searched	1. The user logs into the system and navigates to the “view charts” page. 2. They enter a start date that is in the past into the start date field and an end date that is the current date in the end date field. 3. The user clicks “search”. 4. The system should display previews for all of the charts that are within the date range specified ordered by most recent first.
Chart can be created	1. The user logs into the system and navigates to the “charts” page. 2. The user enters the incident details. 3. The user navigates through the form filling out required fields. 4. The user confirms the information on the “confirm” section. 5. The user clicks on the submit button. 6. The user is redirected to the “view charts” page.
Chart can be viewed and semi-edited	1. The user logs into the system and navigates to the “view charts” page. 2. They select one of the charts for viewing and are redirected to the ‘view’ page. 3. The system displays all the chart information, and the user can then navigate to edit the chart if desired.
Registration successful	1. The user visits the registration page. 2. The user enters their account details into the form. 3. The user is eligible for sign up. 4. The user hits the submit button to register. 5. The user can go back to the login page and login.

Unhappy Path

Table 3: The unhappy path shows the workflow where the user runs into an error. The table also shows how the team will approach and validate the situation.

Path Title	Path Description
Chart is not searched	● The user entered a patient's first and last name, but no chart associated with it shows up. Check if the full name is correct or reset the filters and search manually to check for the patient's correct name. Check if the database contains the patient's name? ● The user entered a patient's date of birth, but the page displays charts that do not match the date of birth. Check if the date is entered in the DD-MM-YYYY format. Check the database to make sure the same format is applied. ● The user entered a start date that is in the future and an end date that is in the past. A warning message is displayed saying "Start date cannot be after the end date". The system does not change the results that were already displayed on the page.
Failure to create chart	● The user did not enter all of the required fields. An error message is displayed notifying the user that all fields must be entered. ● The user entered all fields and clicked the submit button, but the system does not redirect the user to the "view charts" page. Check the code for the routing. Is the system broken? Check the database to make sure the chart was inserted. ● The user entered all fields and clicked the submit button, but the chart is not showing up in the "view charts" page. Was the backend working? Check if the database contains the new chart. Check if all input field names match the ones in the database. ● The chart is created, but the interventions are not showing. Did the interventions get inserted into the database and assigned the correct chart ID? Check the database for the information.
Chart cannot be viewed or edited	● The user clicks on a chart from the "view charts" page and the information is wrong. Did the system redirect the user to the wrong chart ID? Check the database for the information. What ID is it returning - the one before it, the one after it, or randomly? Check the code. ● The user has not created any charts yet. The system displays a message that says "No charts found" and offers a refresh button.
Registration failed	● The user did not enter all of the required fields. An error message is displayed notifying the user that all fields must be entered.

	• The user has already signed up for the system. An error message is displayed notifying the user that they have already signed up. • The user's email is not eligible for account creation. An error message is displayed telling the user that they are unauthorized.

Testing Strategy

Types of Testing

The team will conduct acceptance tests and user tests in order to verify and validate the features of the system. The team will first undergo a series of these tests until the web application has the core functionality working.

Testing Responsibilities

In terms of how we are going to assign testing as a team, the below is outlined to show what each member will be testing from the test plan shown in Table 4.

- Kennedy will be responsible for testing the third, fourth, and ninth items on the test plan. He will conduct the testing after the demo with the team's instructor, Ms. Devrin Lee.
- Mason will be responsible for testing the seventh, eighth, and twelve items on the test plan.
- Yi will be responsible for testing the fifth, sixth, and eleventh items on the test plan.
- Alexander will be responsible for the testing first, second, and tenth items on the test plan.

Project Completeness and Defects

The team has a plan in place for evaluating the completeness of the project. For the project to be considered complete, the core requirements that the ambulance team need in the system must be finished. Alongside completing the core requirements, the system must have all the testing that needs to be conducted finished. All the tests must pass, the code must be complete, and the project sponsor must be satisfied with the result for the project to be considered complete. Once all of those criteria are met, the team will consider the project complete.

Defects will be handled by the corresponding team member that was responsible for the story's functionality. Since the team will not be testing their own developed functionalities, the team members will keep a shared defect log with a description of the defect and the name of the person responsible for resolving it. A status description field will be present in the defect log to mark the defect as resolved once resolved. For a defect to be marked as resolved, the defect must pass the test that it failed prior to making corrections.

Test Plan

Table 4: Test plan for acceptance criteria and workflow items.

Test No.	Test Type	Test Data or Situation	Purpose	Expected Result
1	Automated acceptance test	1. Blanks in form fields. 2. User email is unauthorized for registration. 3. User email is already registered. 4. User email is authorized for registration.	Tests that the registration page works as expected.	1. The error message from the backend or frontend is rendered onto the page telling the user all fields are not entered. 2. Error message is rendered onto the page telling the user they are not authorized. 3. Error message is rendered onto the page telling the user they are registered already. 4. Success message is rendered onto the page telling the user they are registered.
2	Automated acceptance test	1. Blanks in form fields. 2. Invalid credentials. 3. Valid credentials.	Tests that the login page works as expected.	1. The error message from the backend or frontend is rendered onto the page telling the user all fields are not entered. 2. The error message is rendered onto the page telling the user the credentials are invalid. 3. Redirection to the dashboard.
3	Automated acceptance test	1. Toggle button is selected.	Tests that the language can be toggled.	1. The language will toggle to English or Spanish.
4	Automated acceptance test	1. Form data.	Tests that user input is not erased when moving to the next or previous page in chart creation.	1. The state of form entry will not be lost when moving pages.
5	Automated acceptance test	1. Normal User 2. Admin User 3. Non-User	Tests the role based access feature of the application.	1. All the pages will render except the admin settings. 2. All the pages will render. 3. None of the pages will render, will be redirected to the login page.
6	Automated acceptance	1. User email entered. 2. Delete button is	Tests the role of the admin for	1. The admin settings table will render a new row for the added

	test	selected.	adding/deleting authorized emails to the system.	email. 2. The admin settings table will remove the row.
7	Automated acceptance test	1. Blanks in form fields. 3. Form data filled by existing patient information.	Tests the patient information section of the chart pages works as expected.	1. The error message from the backend or frontend is rendered onto the page telling the user the required fields are not entered. 2. Existing information is populated into the input fields.
8	Automated acceptance test	1. Form data submitted.	Tests the temporary storage of the procedures and medications before the chart is inserted into the database.	1. The popup closes and the "interventions" section renders a table of the added procedure or medication.
9	Automated acceptance test	1. Form data submitted. 2. Invalid inputs.	Tests the charts confirmation works as expected.	1. Success message renders onto the page saying the chart was created, and the user redirected to the "view charts" page. 2. The error message from the backend or frontend is rendered onto the page telling the user to enter the correct fields.
10	Automated acceptance test	1. Add notes button clicked.	Tests that the only editable section charts page is the notes.	1. The page renders the new note added to the chart at the bottom.
11	Automated acceptance test	1. Print button clicked or CTRL+P pressed.	Tests the print window to generate PDF or print works as expected.	1. On the "view charts" page, the print window will be rendered on top of the page.
12	Automated acceptance test	1. Two date ranges entered. 2. Blank fields.	Tests that the statistical analysis page works as expected.	1. The page renders the summary reports of the two dates entered by the user. 2. The page has nothing to show.

Contribution of Team Members

Member	Hours	Contributions
Kennedy Anukam	5	1. Project Update and Changes 2. Testing Workflow - Registration 3. Project Completeness and Defects 4. Testing Strategy a. Testing Responsibilities b. Project Completeness and Defects c. Test Plan
Mason Harlan	5	1. Abstract 1. User Stories and Acceptance Criteria 2. Testing Workflow - Search 3. Testing Strategy a. Testing Responsibilities
Yi Jiang	5	1. User Stories and Acceptance Criteria 2. Testing Workflow - Chart Creation 3. Testing Strategy a. Testing Responsibilities b. Test Plan
Alexander Moore	5	1. User Stories and Acceptance Criteria 2. Testing Workflow - View Chart 3. Testing Strategy a. Testing Responsibilities b. Test Plan