

PulseTile: End-To-End testing

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Introduction

End-to-End Testing is a tool which gives the possibility to check the work of web-application in the browser, ie to exercise a complete production-like scenario. This type of control is based on doing some operations step-by-step and comparing expected and received results.

This manual consists of three separate parts.

In the first part, we described the structure of the tested project. The project presents a structure of files and directories, and each of them has certain target function.

In the second part, we reviewed tools and environments used for End-to-End Testing implementation.

In the third part, we described the operational method of the End-to-End Testing.

Project structure

Structure of directories and files of the project is shown below:

```
---- root/
----- node_modules/
----- page_objects/
----- angularDatePicker.js
----- loginPage.js
----- patientInformationPage.js
----- patientSummaryPage.js
----- reactDatePicker.js
----- topBar.js
----- topBarShowcase.js
----- reports/
----- tests/
----- allergiesTest.js
----- breadcrumbsTest.js
----- contactsTest.js
----- loginTest.js
----- medicationsTest.js
----- patientAccordionTest.js
----- patientInformationTest.js
----- patientSummaryRedirectTest.js
----- patientSummaryTest.js
----- personalNotesTest.js
----- problemsTest.js
----- sideBarMenuTest.js
----- vaccinationsTest.js
----- utils/
----- deleteItems.js
----- devDeleteList.json
----- isTestChecked.js
----- scrollPage.js
----- showcaseDeleteList.json
----- .gitignore
----- globals.js
----- LICENSE
----- nightwatch.json
----- package.json
----- package-lock.json
----- README.md
----- selenium-debug.log
```

root/

.gitignore - the list of directories, files and file extensions which can't be added to commits and to the pull-requests

globals.js - export the module with a list of rules. These rules present helper functions that are called behind the scenes or explicitly in the following cases:

- before/after each test is run;
- removing single test item;
- removing all test items;
- date picking

LICENSE -

nightwatch.json - JSON-format array with all settings which are required for test realization

package.json -

package-lock.json - the list of Node- and React- modules/plugins versions, that included in this project

README.md - the information for the users how to install and set the project

node_modules/

This directory is used to locate all NodeJs- and ReactJS- plugins and modules which are required for tests working.

page_objects/

Each JS-file in this directory exports a module, which includes required settings:

angularDatePicker.js, reactDatePicker.js - for Angular/React datepicker;

loginPage.js - for login page;

patientInformationPage.js - for Patient Information page;

patientSummaryPage.js - for Patient Summary page;

topBar.js - for topbar menu;

topBarShowcase.js - for topbar (in Showcase-version)

reports/

This directory is used to locate report information after tests passing. There are report HTML-file, screenshots etc

tests/

Each JS-file in this directory exports a module, which conducts certain type of checking / verification:

- allergiesTest.js*** - working of core-plugin Allergies;
- breadcrumbsTest.js*** - breadcrumbs component rendering;
- contactsTest.js*** - working of core-plugin Contacts;
- loginTest.js*** - user authorization process;
- medicationsTest.js*** - working of core-plugin Medications;
- patientAccordionTest.js*** - patient accordion component rendering;
- patientInformationTest.js*** - patient information component rendering;
- patientSummaryRedirectionTest.js*** - redirecting to patient summary page;
- patientSummaryTest.js*** - patient summary page rendering;
- personalNotesTest.js*** - personal notes component rendering;
- problemsTest.js*** - working of core-plugin Problems (Diagnosis);
- sideBarMenuTest.js*** - sidebar menu component rendering;
- vaccinationsTest.js*** - working of silver-plugin Vaccinations

utils/

deleteItems.js, devDeleteList.json, showcaseDeleteList.json - this file includes a function and settings which are used for removing test data

isTestChecked.js - this file include a function which checks that est is used in the current version

scrollPage.js - this file includes a function which scrolls a browser page

TOOLS AND ENVIRONMENT

End-to-End tests are written using the Nightwatch.js framework the framework Nightwatch.js which is based on Node.js. The main advantages of this framework are:

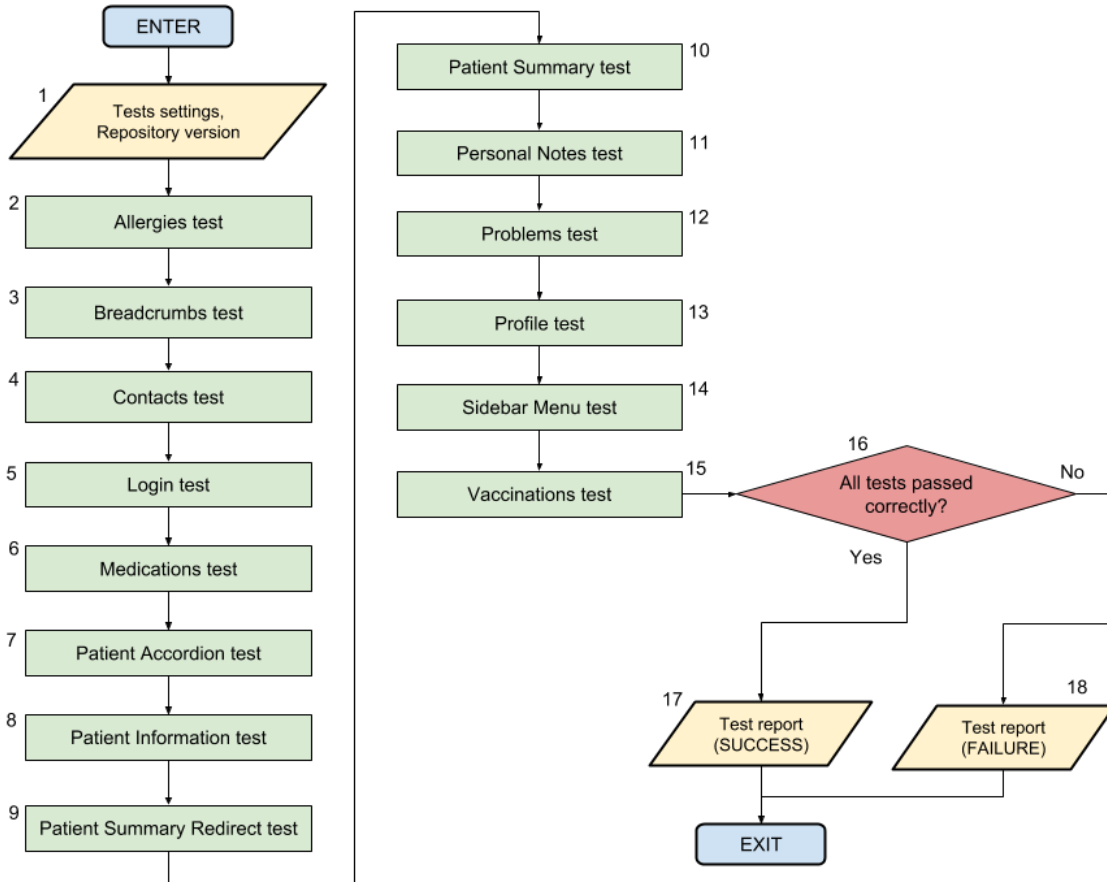
- Nightwatch.js has simple but powerful syntax which helps to write tests very quickly, using only Javascript (Node.js) and CSS or Xpath selectors;
- Built-in command-line test runner in Nightwatch.js can run the tests either sequentially or in parallel, together, by group, tags or single;
- Nightwatch.js controls the Selenium standalone server automatically in a separate child process; can be disabled if Selenium runs on another host;
- In Nightwatch.js either CSS or Xpath selectors can be used to locate and verify elements on the page or execute commands;
- Flexible command and assertion framework which makes it easy to extend to implement an application specific commands and assertions;
- JUnit XML reporting is built-in so you can integrate your tests in your build process with systems such as Teamcity, Jenkins, Hudson etc.

Tests run by open source automation server Jenkins. It takes test code from GitHub and runs them using its own settings. Below you could find main benefits why use Jenkins:

- Jenkins is easy to install: it is a ready to run out-of-the-box, with packages for Windows, Mac OS X and other Unix-like operating systems;
- Jenkins can be easily set up and configured via its web interface, which includes on-the-fly error checks and built-in help;
- With hundreds of plugins, Jenkins integrates with practically every tool in the continuous integration and continuous delivery toolchain;
- Jenkins also can be extended via its plugin architecture, providing nearly infinite possibilities for what Jenkins can do;
- Jenkins can easily distribute work across multiple machines, helping drive builds, tests and deployments across multiple platforms faster.

COMMON ALGORITHM

End-2-End Testing consists of thirteen separate tests, which check working of the PulseTile application in the browser. Tests work one after another. Report about test results are formed when all tests are passed. Common scheme of the test algorithm is presented at the image below.



Initial data for testing is located in the settings file nightwatch.json which is located in the root application directory. Parameters value depends on the test version. Lists of test parameters are presented in the tables below:

Parameter	Description	Version	Value
launchUrl	Launch page of the application. Login form must be located here	Showcase	https://seureshowcase.ripple.foundation/
		Dev-Angular	
		Dev-React	

		Helm	http://dev.ripple.foundation:8000
version	Application version	Showcase	showcase
		Dev-Angular	dev_ang
		Dev-React	dev_react
		Helm	helm
loginInput	Test user's login	Showcase	Alen
		Dev-Angular	
		Dev-React	
		Helm	ivor.cox@ripple.foundation
passwordInput	Test user's password	Showcase	070790
		Dev-Angular	
		Dev-React	
		Helm	IvorCox1!
testNotChecked	List of tests which isn't used for the current version	Showcase	empty
		Dev-Angular	empty
		Dev-React	empty
		Helm	personalNotesTest
loginButton	CSS selector for login button	Showcase	button.auth0-lock-submit
		Dev-Angular	
		Dev-React	
		Helm	input[name^='login']
menuItems	List of items which must be presented in the left sidebar menu	Showcase	Problems, Contacts, Medications, Allergies, Clinical Notes, Personal Notes, Vaccinations
		Dev-Angular	
		Dev-React	

		Helm	Contacts, Medications, Allergies, Vaccinations, Diagnosis, Top Three Things
userInfo	Patient information for the user profile testing	Showcase	"name" : "Alen Mekka", "userType" : "PHR", "email" : "aschenputtel123912@gmail.com", "birthday" : "10/05/2099",
		Dev-Angular	
		Dev-React	
		Helm	"name" : "Ivor Cox", "userType" : "PHR", "email" : "", "birthday" : "10/05/2099"
patientSummary Main	Link name for the Patient Summary page	Showcase	Patient Summary
		Dev-Angular	
		Dev-React	
		Helm	Home

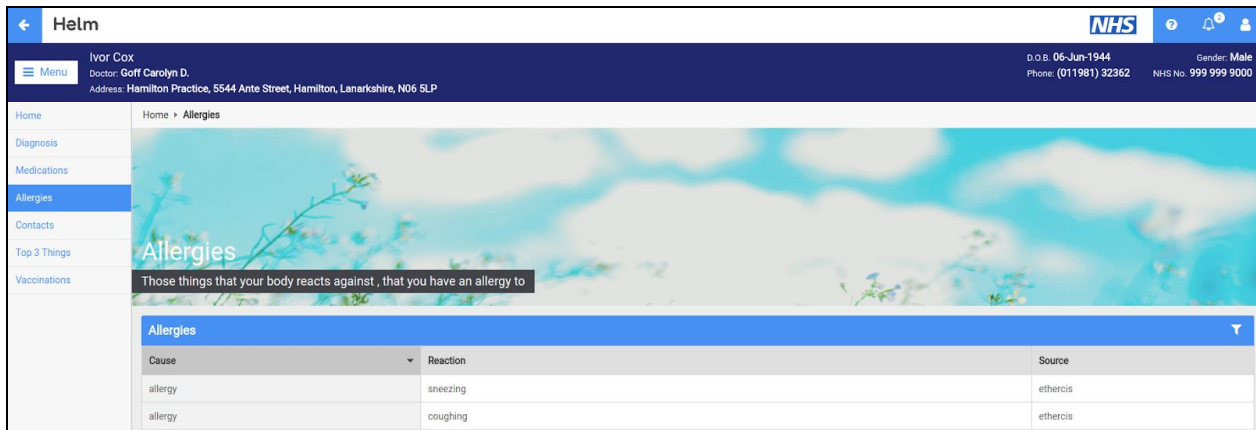
Description of common test scheme is located below:

Block	Description
1	Initial data is passed to the program
2	Work of Core-plugin Allergies checking
3	Breadcrumbs rendering checking
4	Work of Core-plugin Contacts checking
5	Work of login form and user authorization checking
6	Work of Core-plugin Medications checking
7	Patient Accordion rendering checking
8	Patient Information rendering checking

9	Redirecting between left sidebar checking
10	Patient Summary rendering checking
11	Work of Core-plugin Personal Notes checking
12	Work of Core-plugin Problems checking
13	User profile rendering checking
14	Left sidebar rendering checking
15	Work of Silver-plugin Vaccinations checking

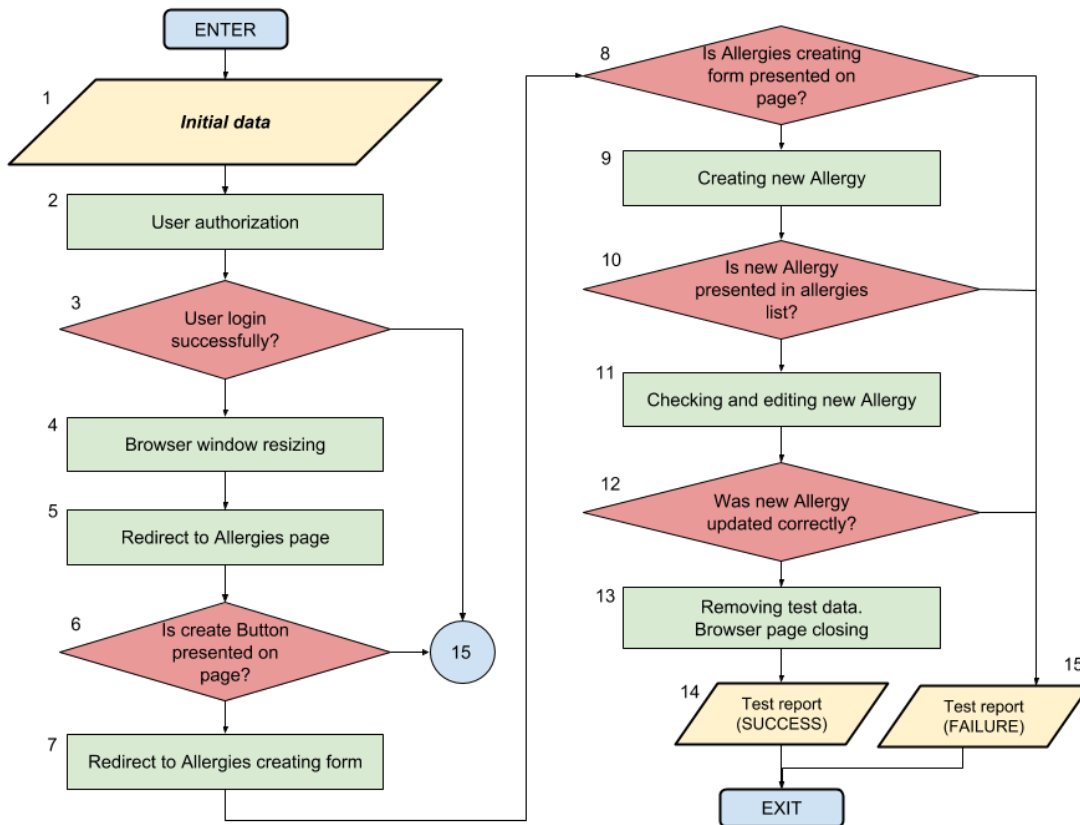
ALLERGIES TEST

This test checks the work of core-plugin Allergies.



It is necessary to check:

- possibility to enter Allergies list;
- rendering of Allergies creating form;
- creating new Allergies and updating information about Allergies.



Description for est scheme is located below:

Block	Description
1	Initial data is passed to the program
2-3	User authorization and checking, that user logged in correctly
4	Redirecting to Patient Summary page and Browser window resizing
5-6	Redirecting to Allergies page. Checking, that allergies list and button Create are presented on this page
7-8	Redirecting to Allergies creating form and checking that it was rendered correctly
9-10	Creating new Allergy and checking that it is presented in the allergies list after it
11-12	Updating information about Allergy and checking, that changes is presented
13	Removing test data and closing browser page
14-15	Preparing report about the test results

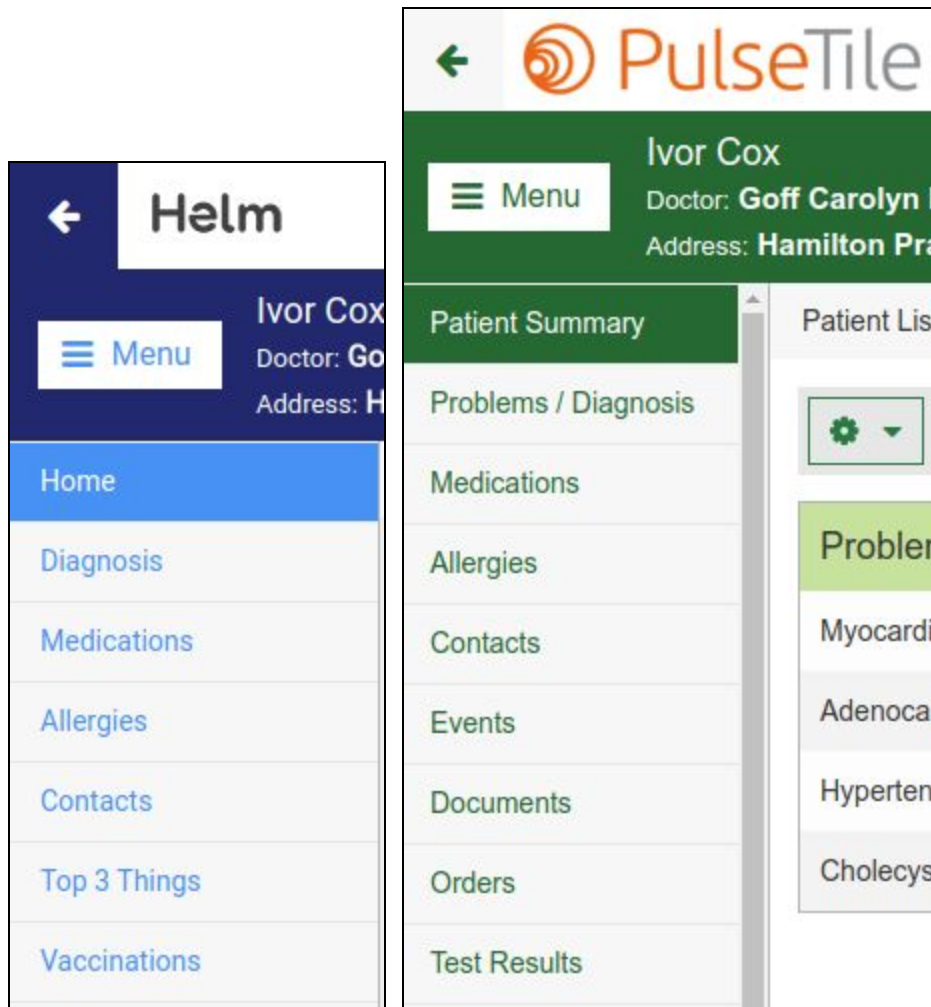
The same algorithm is used to check the work of:

- core-plugin **Contacts**;
- core-plugin **Medications**;
- core-plugin **Problems**;
- silver-plugin **Vaccinations**.

BREADCRUMBS TEST

This test checks the work of left sidebar menu. It monitors those menu items are present in the menu and are clickable. List of these items can be different depends on the version.

For this reason, the list of checked items is one of settings, that is set in *nightwatch.json* settings file.



Lists of menu items that checked are shown below:

Version	Items
Showcase	Problems, Contacts, Medications, Allergies, Clinical Notes, Personal Notes, Vaccinations
Dev-angular	
Dev-React	

CONTACTS TEST

Algorithm that checks the work of core-plugin **Contacts** is similar to the algorithm for the **Allergies** plugin check.

The screenshot displays the NHS Helm patient portal interface. At the top, the patient's name 'Ivor Cox' is shown, along with their doctor 'Goff Carolyn D.' and address 'Hamilton Practice, 5544 Ante Street, Hamilton, Lanarkshire, N06 5LP'. The NHS logo and patient details (D.O.B. 06-Jun-1944, Gender: Male, Phone: (011981) 32362, NHS No. 999 999 9000) are visible in the top right. A left-hand navigation menu includes options like Home, Diagnosis, Medications, Allergies, Contacts, Top 3 Things, and Vaccinations. The main content area is titled 'Contacts' and features a red rotary telephone graphic. Below the title is a descriptive text: 'The key people in your life, that you keep in contact with on a regular basis'. A table lists the contacts with columns for Name, Relationship, Next Of Kin, and Source.

Name	Relationship	Next Of Kin	Source
Andrew Finch	Son	Yes	marand
Annette Joe	Wife	Yes	ethercis
Bruce Wayne	Key formal care worker	No	ethercis
Fred Bloggs	Friend	No	ethercis
Janice Cox	Daughter	Yes	marand

+ Create

LOGIN TEST

This test controls the process of user authorization. It checks next:

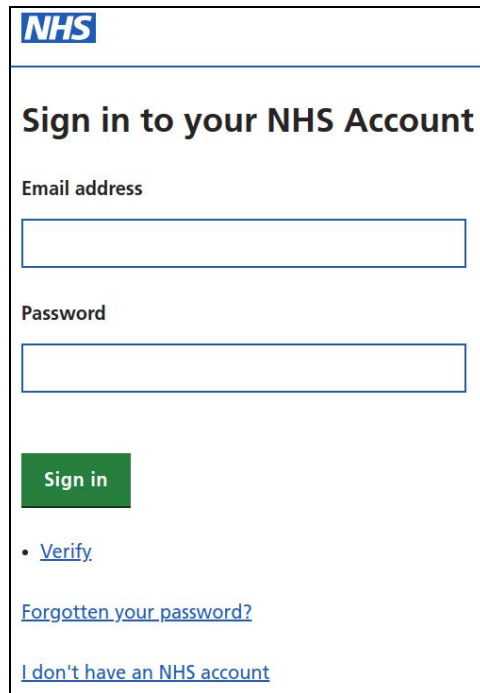
- Launch page is loaded correctly;
- Login form is rendered correctly and all required elements are presented here;
- Initial user data is presented in the database;
- Patient summary page is loaded after authorization;
- Patient information at summary page corresponds to request.

Initial data of login tests is described in the table below:

Parameter	Description	Version	Value
<i>launchUrl</i>	Launch page of the application. Login form must be located here	Showcase	https://seureshowcase.ripple.foundation/
		Dev-Angular	
		Dev-React	
		Helm	http://dev.ripple.foundation:8000
<i>loginInput</i>	Test user's login	Showcase	Alen
		Dev-Angular	
		Dev-React	
		Helm	ivor.cox@ripple.foundation
<i>passwordInput</i>	Test user's password	Showcase	070790
		Dev-Angular	
		Dev-React	
		Helm	IvorCox1!
<i>loginButton</i>	CSS selector for login button	Showcase	button.auth0-lock-submit
		Dev-Angular	
		Dev-React	
		Helm	input[name^='login']

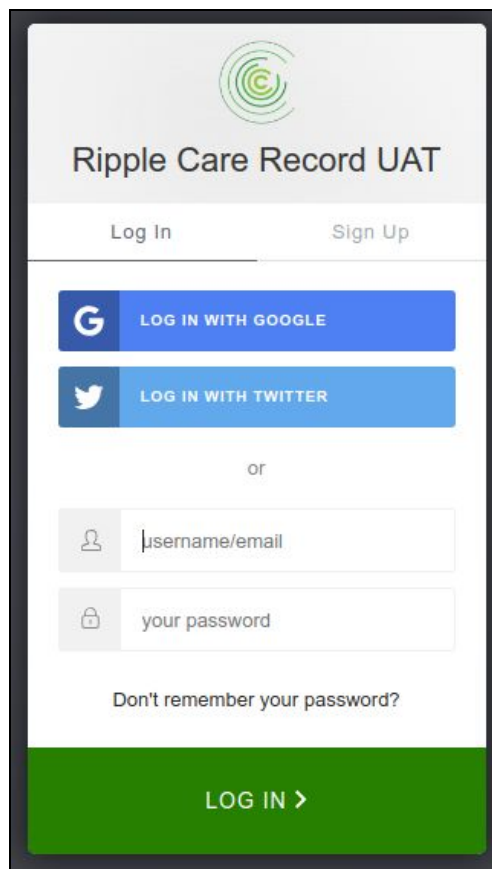
<i>waitingTime</i>	Maximal time for elements rendering	Showcase	25000 msec
		Dev-Angular	
		Dev-React	
		Helm	
<i>userInfo</i>	Patient information appears after page rendering	Showcase	"name" : "Ivor Cox", "doctor" : "Doctor: Goff Carolyn D.", "address" : "Address: Hamilton Practice, 5544 Ante Street, Hamilton, Lanarkshire, N06 5L", "birthday" : "D.O.B. 06-Jun-1944", "phone" : "Phone: (011981) 32362", "gender" : "Gender: Male", "number" : "NHS No. 999 999 9000",
		Dev-Angular	
		Dev-React	
		Helm	

Launch page with login form in Helm version and all other versions:



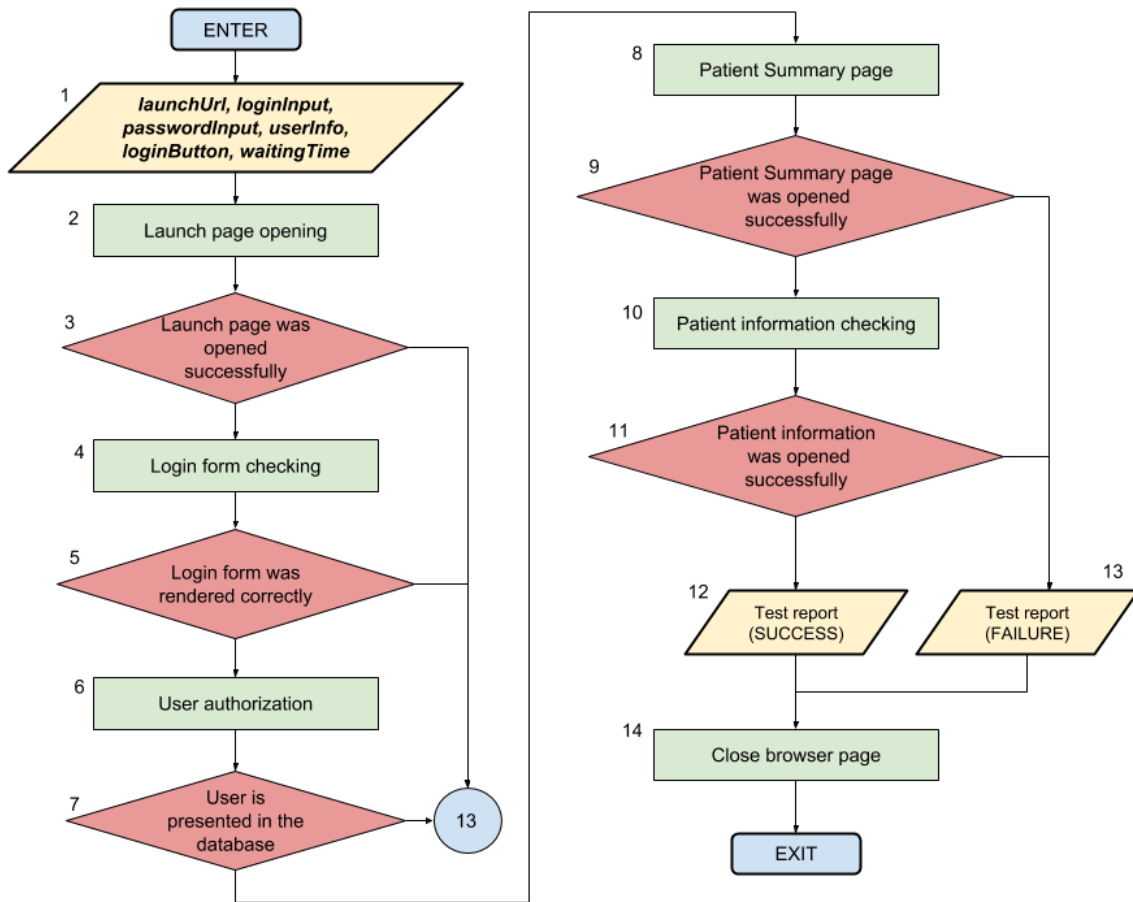
The screenshot shows the NHS login page. At the top left is the NHS logo. Below it is the heading "Sign in to your NHS Account". There are two input fields: "Email address" and "Password". Below the password field is a green "Sign in" button. At the bottom, there are three links: "Verify", "Forgotten your password?", and "I don't have an NHS account".

Launch page with login form in other versions:



The screenshot shows the Ripple Care Record UAT login page. At the top center is a circular logo with a green 'C'. Below it is the heading "Ripple Care Record UAT". There are two buttons: "Log In" and "Sign Up". Below these are two social login buttons: "LOG IN WITH GOOGLE" and "LOG IN WITH TWITTER". Below these is the word "or". There are two input fields: "username/email" and "your password". Below the password field is the text "Don't remember your password?". At the bottom is a large green button with the text "LOG IN >".

Algorithm of login test is shown below:



Description for the login test block scheme:

Block	Description
1	Initial data passes to the test
2 - 3	Browser is opened, launch page is loaded. Checking, that launch page was loaded correctly
4 - 5	Checking, that login form is presented at the launch page and it includes three main elements: <ul style="list-style-type: none"> - Login input field - Password input field - Submit button
6 - 7	User login and password are input to the field and form is submitted. Login and

	password must be presented in the database
8 - 9	If user is presented in the database, browser renders patient summary page. Program checks that this page is rendered correctly
10 - 11	Checking user information at the patient summary page. It must be corresponded to initial data
12 - 13	Test report is formed depends on test result
14	Browser is closed

MEDICATIONS TEST

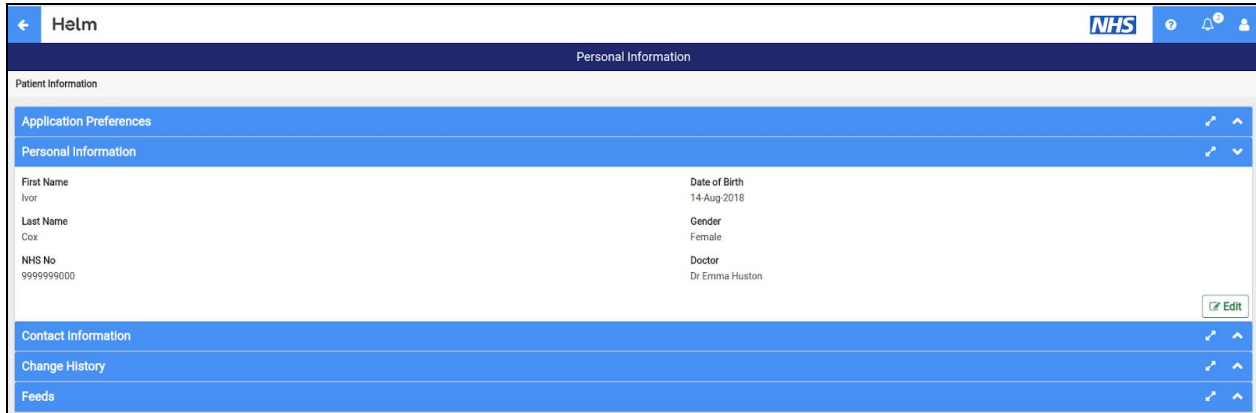
The Algorithm checks the work of core-plugin **Medications**. It is similar to the algorithm for **Allergies** plugin check.

The screenshot shows the NHS Helms patient portal interface. At the top, the user is identified as Ivor Cox, Doctor Goff Carolyn D., with the address Hamilton Practice, 5544 Ante Street, Hamilton, Lanarkshire, N06 5LP. The patient's details include D.O.B. 06-Jun-1944, Gender: Male, Phone: (011981) 32362, and NHS No. 999 999 9000. The main content area features a banner image of various pills and capsules with the heading "Medications" and the subtitle "The medical tablets and other medications that you take regularly for your health care". Below this is a table titled "All Medications" with columns for Name, Dose, Supply, and Source.

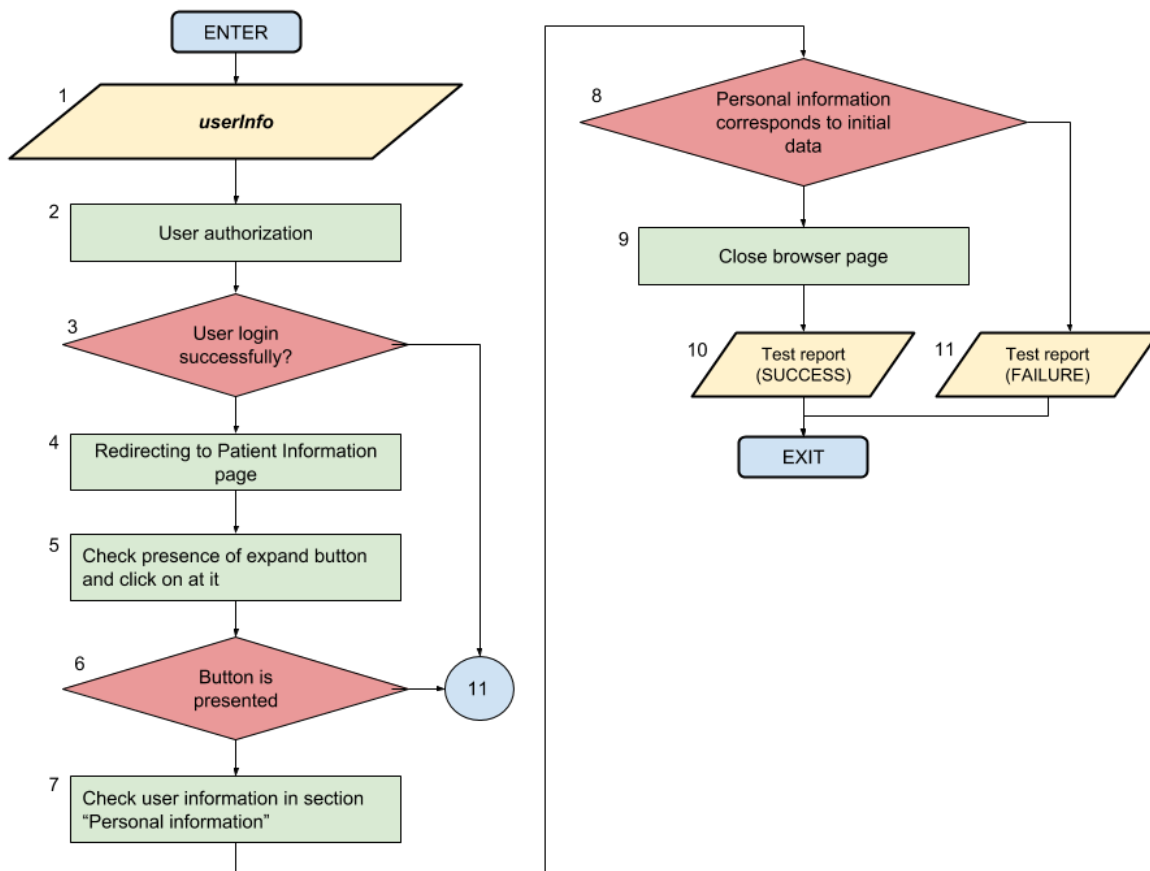
Name	Dose	Supply	Source
Amlodipine 5mg tablets	5 mg oral once a day	19-Jul-2018	marand
Atorvastatin 40mg tablets	40mg oral once a day	19-Jul-2018	marand
Enalapril 10mg tablets	10mg oral once a day, in the morning	19-Jul-2018	marand

PATIENT ACCORDION TEST

This test checks rendering of Patient Information page in Personal Information block.



Algorithm of this test is shown below:



Description for the test block scheme:

Block	Description
1	Initial data passes to the test
2 - 3	Launch page is loaded. Checking, that launch page was loaded correctly
4	Redirecting to Patient Information page
5 - 6	Check the presence on expand button and click on it
7 - 8	Comparing information on Patient Information block with initial data
9	Closing browser page
10-11	Test report creating depends on test result

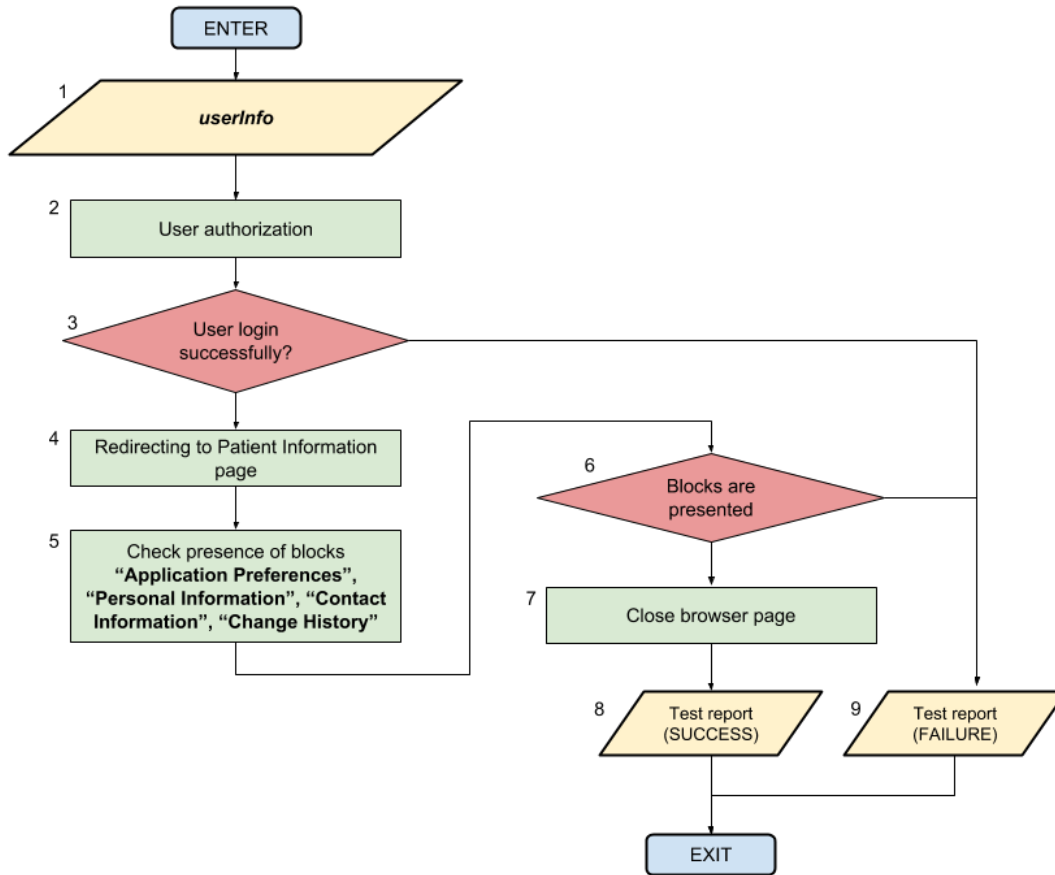
PATIENT INFORMATION TEST

This test checks rendering of Patient Information page.

The screenshot shows the 'Patient Information' page in the Helm interface. The page title is 'Personal Information'. The main content area is titled 'Patient Information' and contains a list of application preferences: 'Application Preferences', 'Personal Information', 'Contact Information', and 'Change History'. Below this list, the 'Change History' section is expanded, showing two changes. Change #1, dated 2018-08-14 11:15, shows the 'Last Name' changing from 'White' to 'Blackwell'. Change #2, also dated 2018-08-14 11:15, shows the 'Address' changing from 'Flower Street' to '6801 Tellus Street'. At the bottom of the main content area, there is a 'Feeds' section. The top navigation bar includes the 'Helm' logo, the NHS logo, and notification icons.

The screenshot shows the 'Patient Information' page in the Helm interface. The page title is 'Personal Information'. The main content area is titled 'Patient Information' and contains a list of application preferences: 'Application Preferences', 'Personal Information', and 'Contact Information'. Below this list, the 'Contact Information' section is expanded, showing a table of contact details. The table has two columns: 'Address' and 'Phone Number'. The 'Address' column contains the following information: '6801 Tellus Street', 'City: Westmorland', 'State: Westmorland', 'Postal Code: Box 306', and 'Country: USA'. The 'Phone Number' column contains '07624 647524' and 'Email'. At the bottom right of the contact information section, there is an 'Edit' button. Below the contact information, there is a 'Change History' section and a 'Feeds' section. The top navigation bar includes the 'Helm' logo, the NHS logo, and notification icons.

Algorithm of this test is shown below:

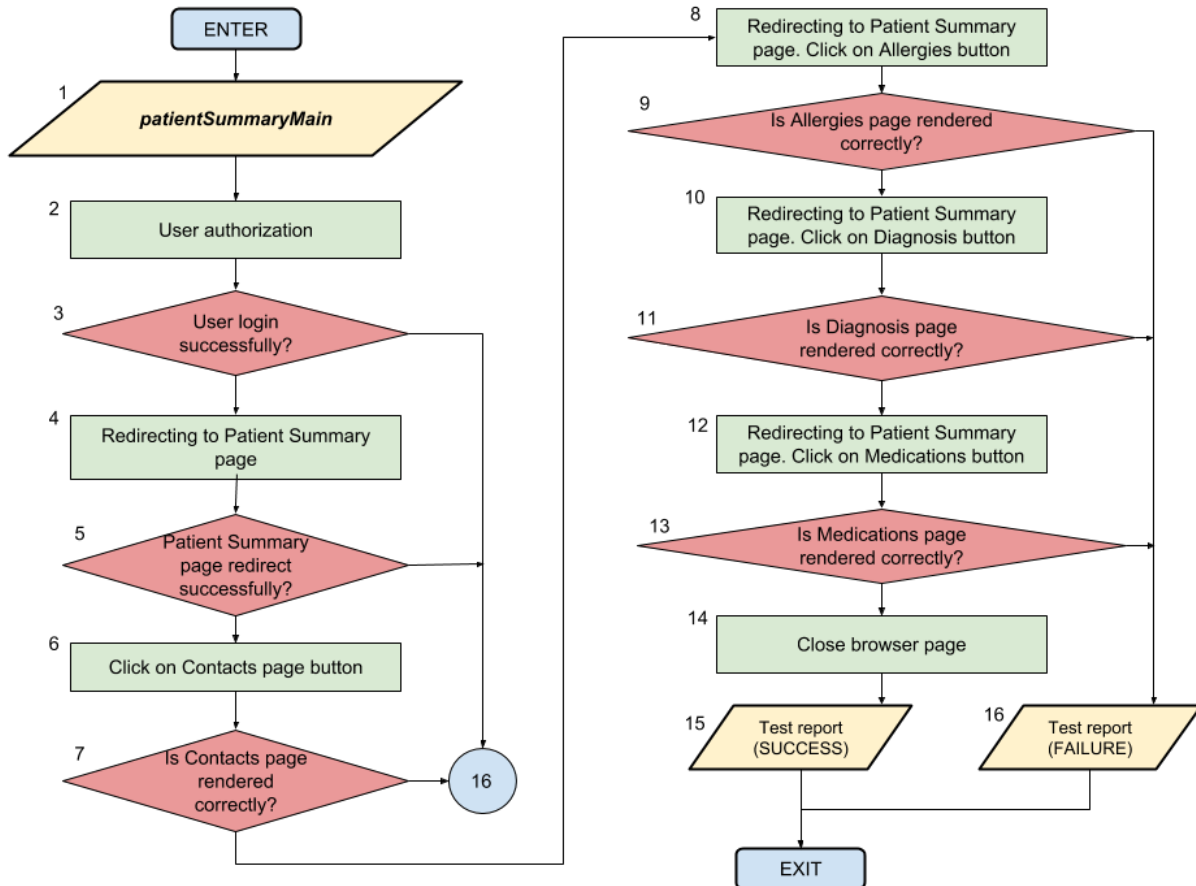


Description for the test block scheme:

Block	Description
1	Initial data passes to the test
2 - 3	Browser is opened, launch page is loaded. Checking, that launch page was loaded correctly
4	Redirecting to Patient Information page
5 - 6	Check the presence of blocks "Application Presence", "Personal Information", "Contact Information", "Change history"
7	Closing browser page
8-9	Test report creating depends on test result

PATIENT SUMMARY REDIRECT TEST

This test checks Patient Summary page displaying and redirecting between items in left bar menu. Algorithm of this test is shown below:



Description for the test block scheme:

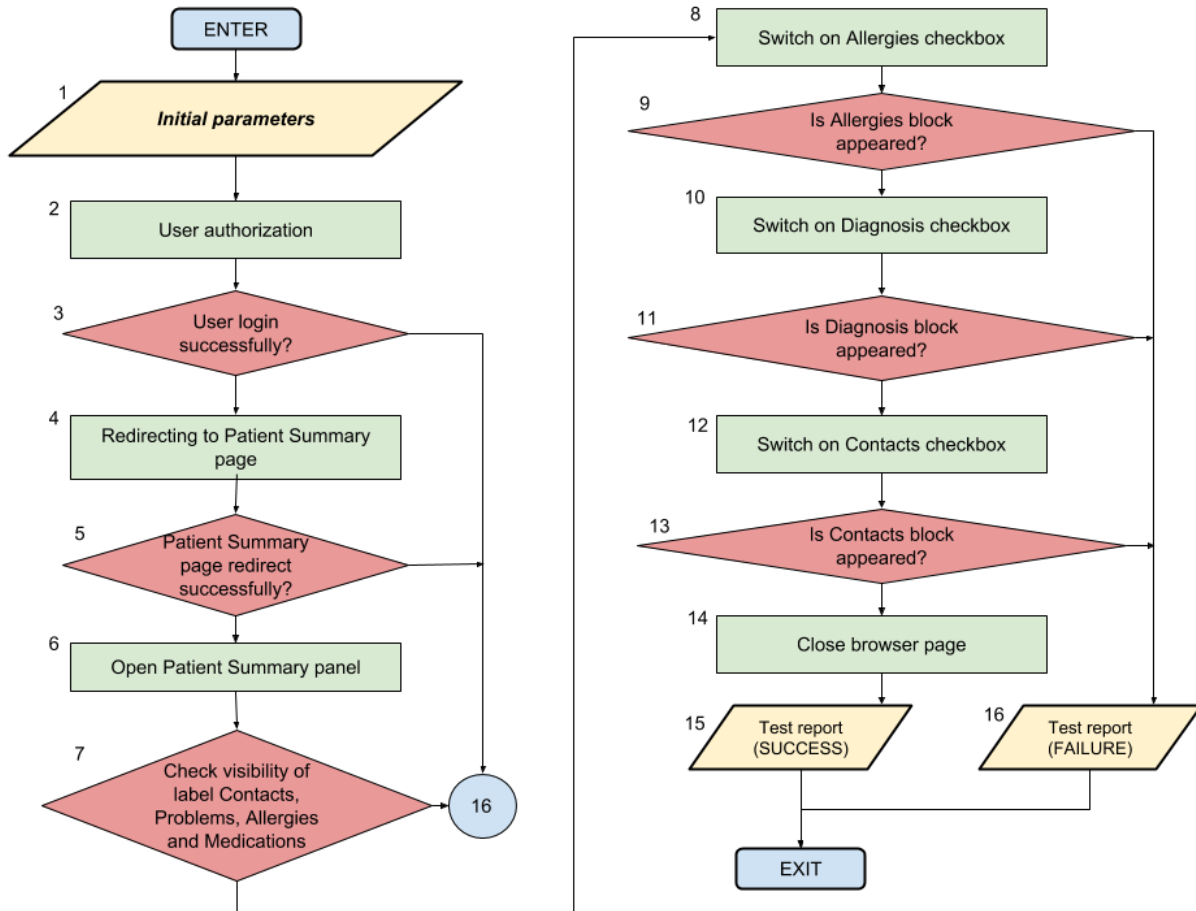
Block	Description
1	Initial data passes to the test
2 - 3	Browser is opened, launch page is loaded. Checking, that launch page was loaded correctly
4 - 5	Checking redirecting of Patient Summary page

6 - 7	Checking redirecting of Contacts page
8 - 9	Checking redirecting of Allergies page
10 - 11	Checking redirecting of Medications page
12 - 13	Checking redirecting of Diagnosis page
14	Closing browser page
15 - 16	Test report creating depends on test result

This test has only one initial parameter - ***patientSummaryMain***. It equals "Home" for Helm-version and "Patient Summary" for all other versions.

PATIENT SUMMARY TEST

This test checks Patient Summary Panel displaying and toggling of heading blocks. Algorithm of this test is shown below:



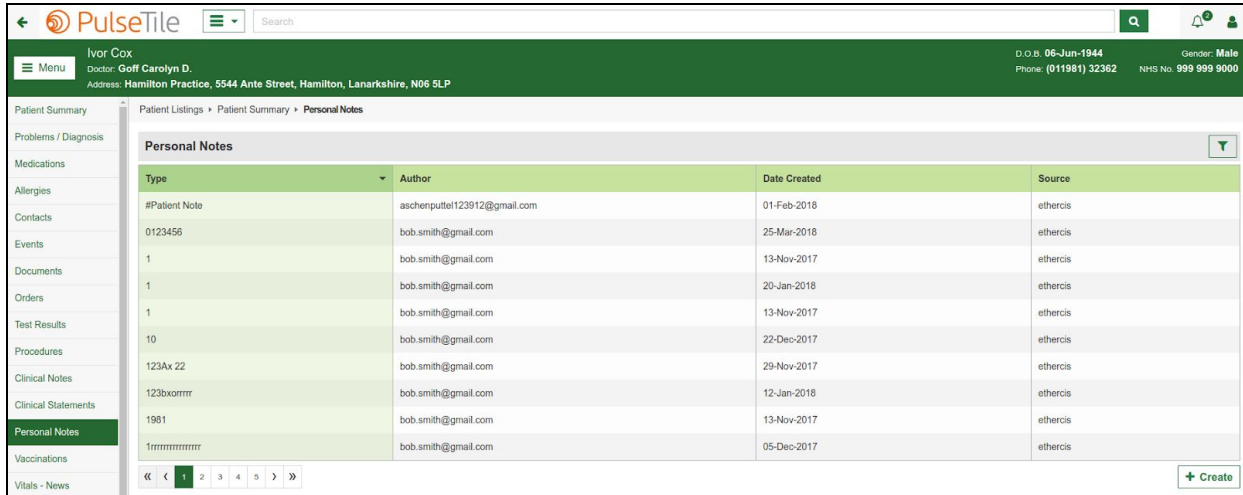
Description for the test block scheme:

Block	Description
1	Initial data passes to the test
2 - 3	Browser is opened, launch page is loaded. Checking, that launch page was loaded correctly
4 - 5	Checking redirecting of Patient Summary page
6 - 7	Open Patient Summary panel and checking presence of checkbox with labels Contacts, Problems, Allergies and Medications
8 - 9	Toggle checkbox Allergies and check that it is appeared

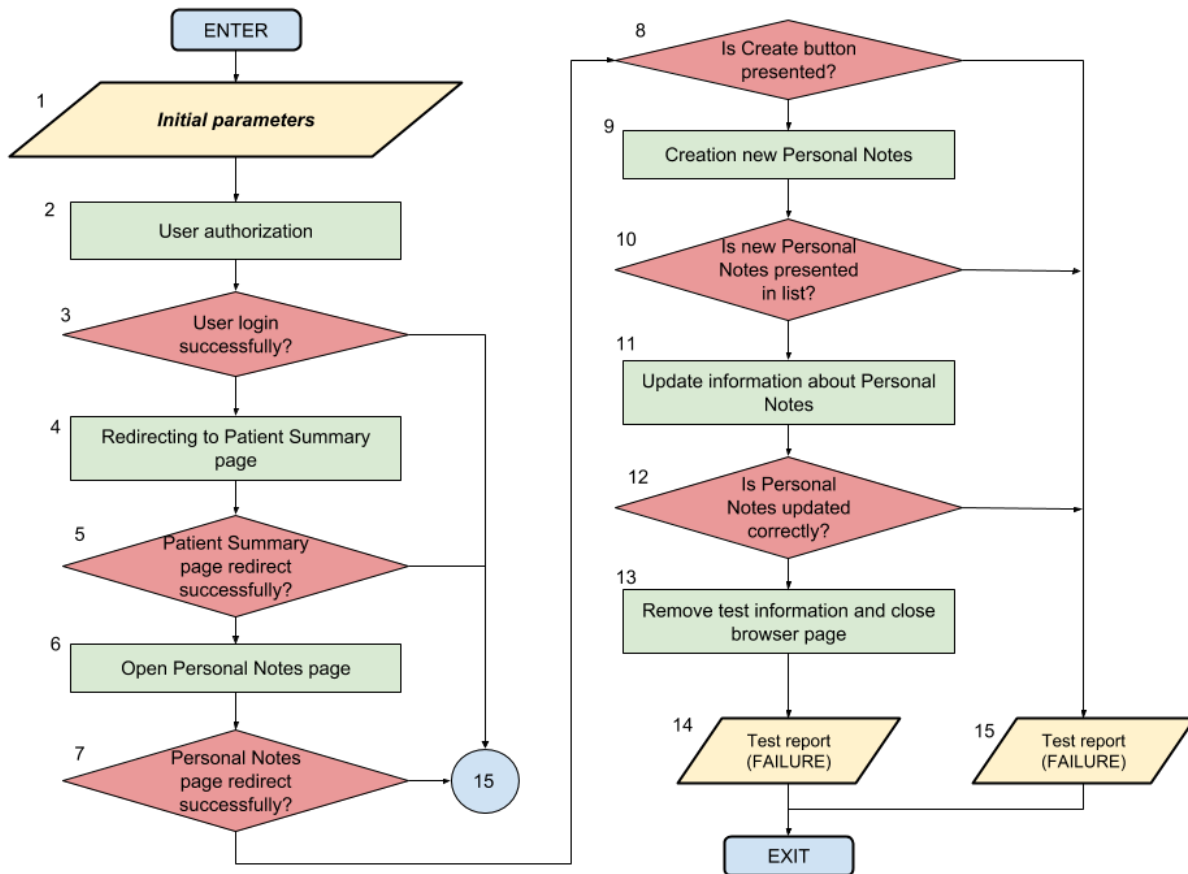
10 - 11	Toggle checkbox Diagnosis and check that it is appeared
12 - 13	Toggle checkbox Medications and check that it is appeared
14	Closing browser page
15 - 16	Test report creating depends on test result

PERSONAL NOTES TEST

This test checks Personal Notes page rendering and possibility to create or update new items.



Algorithm of this test is shown below:



Description for the test block scheme:

Block	Description
1	Initial data passes to the test
2 - 3	Browser is opened, launch page is loaded. Checking, that launch page was loaded correctly
4 - 5	Checking redirecting of Patient Summary page
6 - 7	Checking redirecting of Personal Notes page
8	Checking that button Create is presented on Personal Notes page
9 - 10	Checking possibility to create new Personal Notes
11 - 12	Checking that new Personal Note is presented in list and possibility to update information about it
13	Removing test information and closing browser page
14 - 15	Test report creating depends on test result

This test run only for version that includes Person Notes plugin.

PROBLEMS TEST

Algorithm that checks the work of core-plugin **Problems** and similar to the algorithm for **Allergies** plugin checking.

The screenshot shows the Helm patient interface for Ivor Cox. The top navigation bar includes the NHS logo and patient details: D.O.B. 06-Jun-1944, Gender: Male, Phone: (011981) 32362, NHS No. 999 999 9000. The main content area is titled "Diagnoses" and features a banner image of a stethoscope and a laptop. Below the banner is a table of diagnoses.

Diagnoses	Date	Source
# CONDYLE RIGHT HUMERUS	23-Jun-2018	ethercis
Adenocarcinoma of prostate	16-Jul-2004	marand
AKI	27-Jun-2018	ethercis
Cholecystectomy	11-Apr-2017	ethercis
Dupuytren's contracture	05-May-2015	ethercis
Harlequin Syndrome	17-Jul-2018	ethercis
Hypertension	17-Sep-2004	marand
Kidney Disease (Chronic Kidney Disease)	19-Dec-2017	ethercis
myocardial infarction	09-Sep-2010	ethercis

This plugin calls **Diagnosis** in Helm-version and **Problems** in other version.

The screenshot shows the PulseTile patient interface for Ivor Cox. The top navigation bar includes the PulseTile logo and patient details: D.O.B. 06-Jun-1944, Gender: Male, Phone: (011981) 32362, NHS No. 999 999 9000. The main content area is titled "Problems / Diagnoses" and features a table of problems.

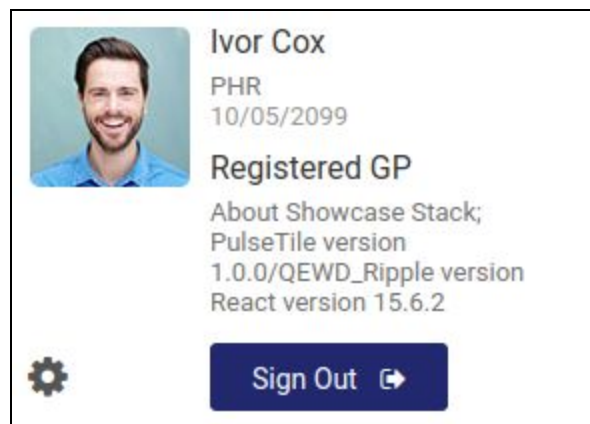
Problems / Diagnoses	Date	Source
# CONDYLE RIGHT HUMERUS	23-Jun-2018	ethercis
Adenocarcinoma of prostate	16-Jul-2004	marand
AKI	27-Jun-2018	ethercis
Cholecystectomy	11-Apr-2017	ethercis
Dupuytren's contracture	05-May-2015	ethercis
Harlequin Syndrome	17-Jul-2018	ethercis
Hypertension	17-Sep-2004	marand
Kidney Disease (Chronic Kidney Disease)	19-Dec-2017	ethercis
myocardial infarction	09-Sep-2010	ethercis
Myocardial infarction	02-Mar-2016	ethercis

PROFILE TEST

This test checks information, that is presented in the user profile block. This test consists of the follow steps:

- user authorization;
- user profile panel opening;
- comparing user information (from settings) with rendering results

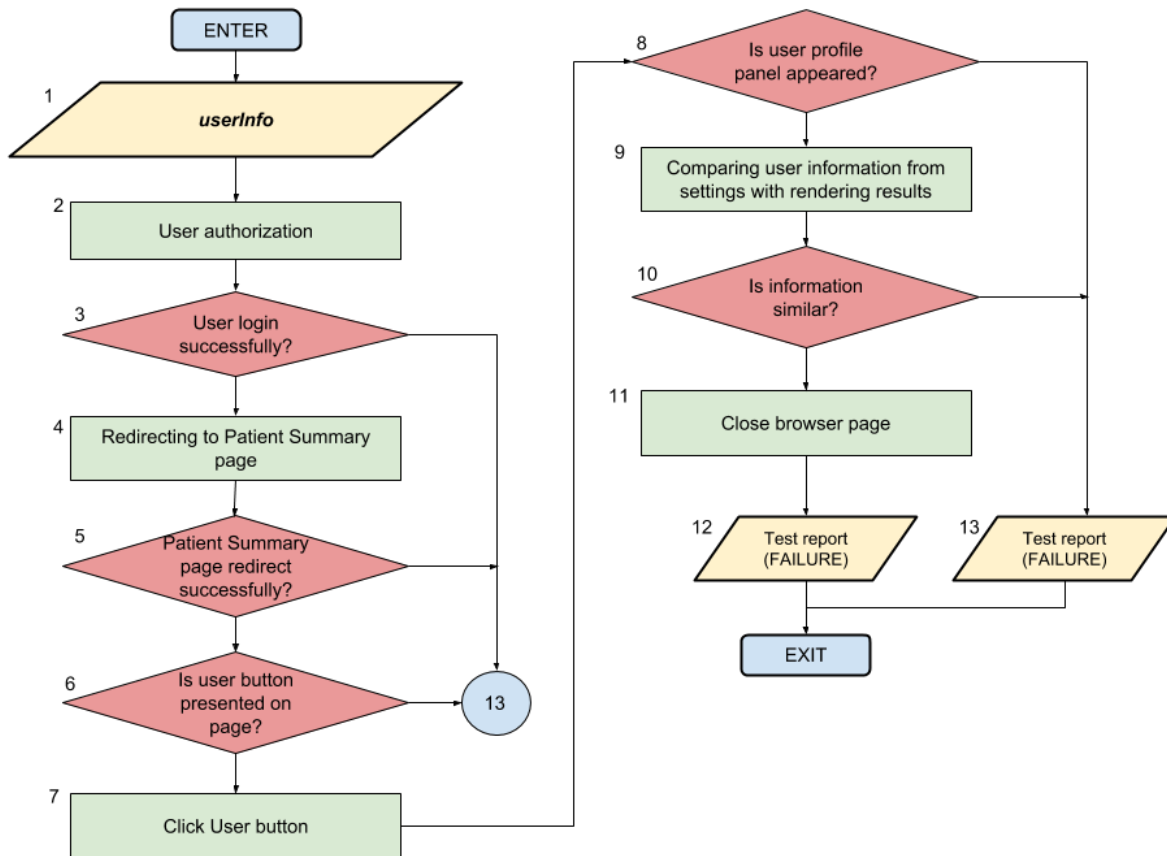
User profile in Helm-version:



User profile in all other versions:



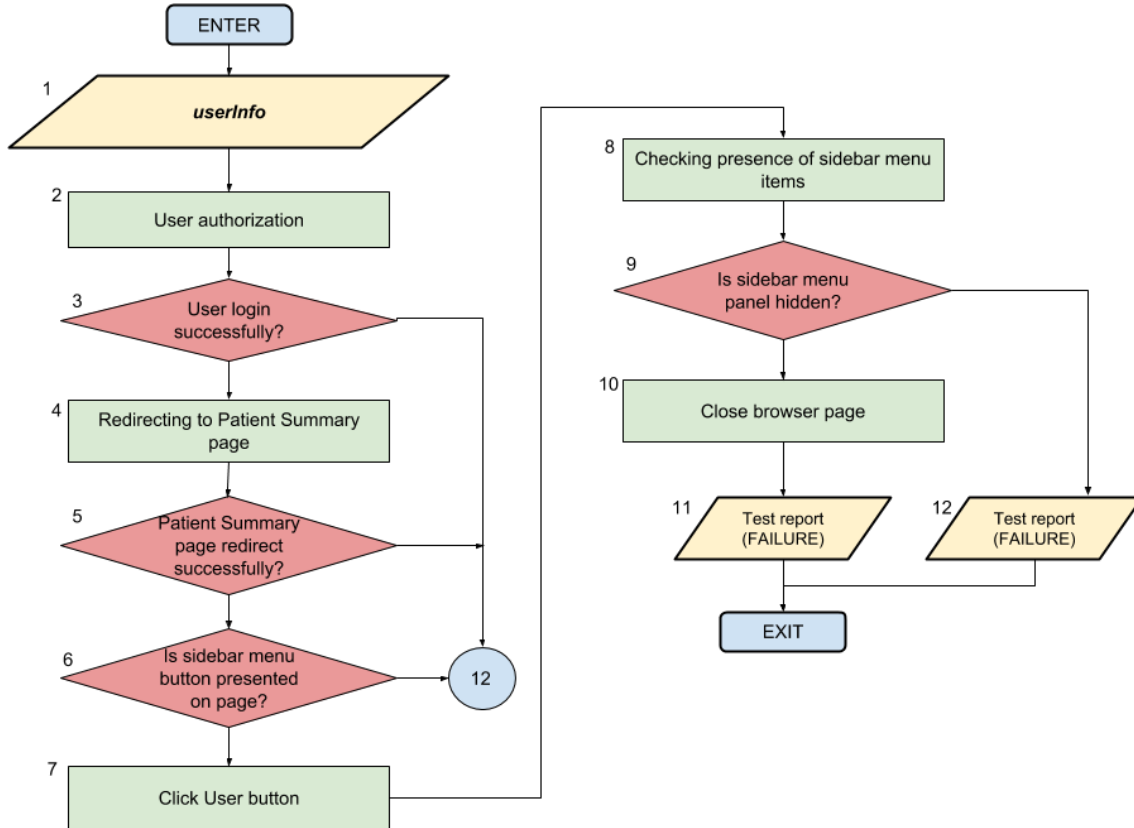
Algorithm of this test is shown below:



This test uses initial parameter *userInfo*, that depends on current version. The value of this parameter is presented in the description for Common algorithm.

SIDEBAR MENU TEST

This test checks the possibility to toggle left sidebar menu. The Algorithm of this test is shown below:

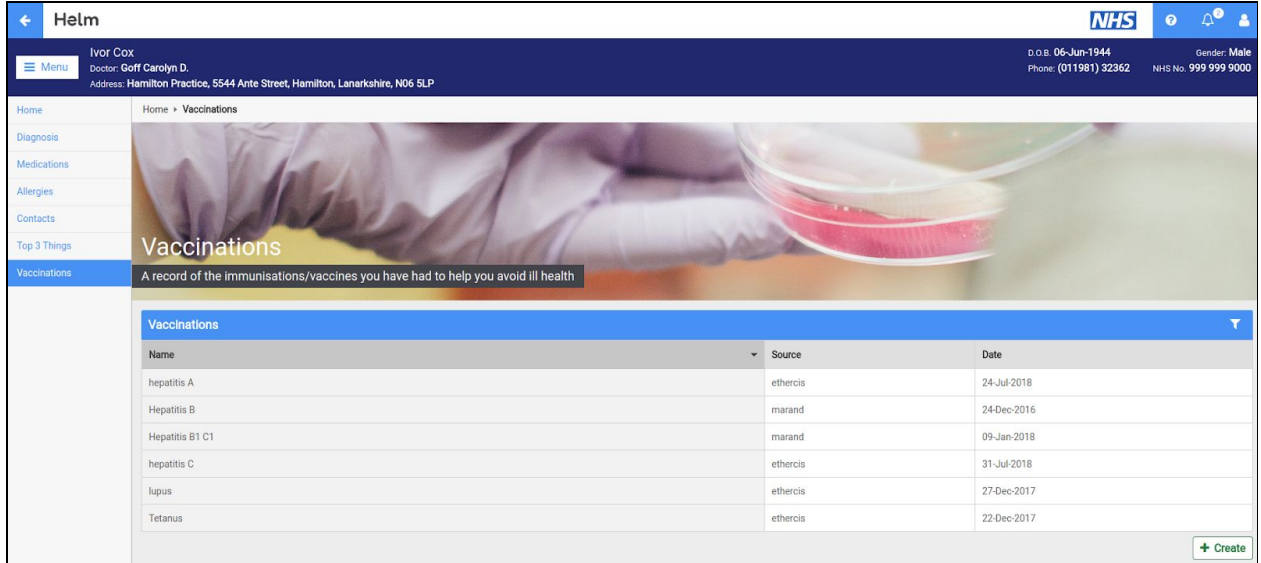


Description for the test block scheme:

Block	Description
1	Initial data passes to the test
2 - 3	Browser is opened, launch page is loaded. Checking, that launch page was loaded correctly
4 - 5	Checking redirecting of Patient Summary page
6	Checking that sidebar menu button is presented on page
7 - 9	Click on the button and check that sidebar menu was hidden
13	Removing test information and closing browser page
14 - 15	Test report creating depends on test result

VACCINATIONS TEST

Algorithm checks the works of silver-plugin **Vaccinations** and similar to the algorithm for **Allergies** plugin checking.



The screenshot shows the Helm NHS patient portal interface. The top navigation bar includes the NHS logo and user information for Ivor Cox, Doctor Goff Carolyn D., with contact details for Hamilton Practice. The main content area features a banner image of a gloved hand holding a petri dish, with the heading "Vaccinations" and a sub-heading "A record of the immunisations/vaccines you have had to help you avoid ill health". Below this is a table listing various vaccinations.

Name	Source	Date
hepatitis A	ethercis	24-Jul-2018
Hepatitis B	marand	24-Dec-2016
Hepatitis B1 C1	marand	09-Jan-2018
hepatitis C	ethercis	31-Jul-2018
lupus	ethercis	27-Dec-2017
Tetanus	ethercis	22-Dec-2017

A "+ Create" button is visible at the bottom right of the table.