Systemtest

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1. Result

Fassen Sie das Ergebnis Ihres Systemtests zusammen – wann wurde der Test mit wie vielen Testfällen durchgeführt, wie viele Fehler wurden in welcher Kritikalität gefunden?

Testing without hardware

All tests were done on 11.06.2022 with about 30 Test Cases all together (see Test Script). After fixing a lot of vulnerabilities, the system in most cases was stable and good in functioning. In order to test the Dashboard with measurement data without using any hardware (Pi, Arduino) we've added an initializer button on the right corner in the dashboard menu. The daily and the weekly initialization is relatively fast according to the monthly.

Fixes for Errors and further test cases were found in many edge cases, e.g. Adding a New User as Manager in a Department with already existing Manager but we tried to cover almost all of those edge cases and fixing the problems.

Testing with Hardware

Arduino and Pi was powered and connected to the Webapps. As our test cases where not too big in numbers, the results where manageable. By using the web application and the hardware, more use cases popped up and therefor more testing cases were added. That showed a few weaknesses, which were small and easy to fix. Because of the Testing go the other team, code could be improved and refined. After that errors or derivations, which the testing group observed, could not longer be replicated.

2. Functionality

- *Welche Überdeckung weisen Ihre Testfälle auf? – Setzen Sie dazu Ihre Testfälle mit den Use Cases in Beziehung.*
- *Sind Schnittstellen zu anderen Systemen mit Testfällen abgedeckt? Ergebnis?*

Webapp Functionality

All use cases from the Use Case diagram were covered. Further edge cases were covered as well. Not every edge case was covered, because the time we had to test and to fix everything was limited.
By modifying an entity successfully or unsuccessfully we decided to added windowed messages for the Front-end, so that its more clear to the user on which input or action was wrong or correct.

PI, Arduino and Rest API Functionality

The coverage of the use cases was good, testing the noice led with loud conversation or clapping covered the Arduino as well as limit variation in the pi, the Webapp (shown in the sensor limitation info) and the Arduino (reaction on nearer limits via LEd) reacted accordingly.

3. Performance, Error tolerance und Stability

Prüfen Sie zumindest folgende Aspekte:

- *Ist das Antwortverhalten des Systems im vereinbarten Rahmen?*
- *Reagiert das System in angemessener Weise auf Fehlerzustände (z.B. Neustart des Minirechners, kurzfristiger Ausfall der Kommunikation zwischen Minirechner und zentralem Backend, etc.)?*
- *Reagiert Ihr System stabil auf fehlerhafte und attackierende Eingaben?*
- *Ist sichergestellt, dass gelöschte/inaktive Benutzeraccounts keine Auswirkungen auf vergangene Berichtszeiträume haben?*

Error handling and stability PI, Arduino

The pi saves the measurement info in a list and concurrently writes it in a log file. If the power gets cut for the pi, after reconnections and rerunning of the code (bash file), log data gets send via the Rest API immediately through a log data post, so it's separated from the normal used measurement post. So, log data can't overwrite the regular send data and visa verse and reconnects to the Arduino instant.
At the moment where the Arduino loses power, the pi has also to restart, as he can't find the Arduino afterwards.
Deleting of users, so that in IT.OFFICE A there are only 4 employees left, does not change the chart for the room.

Error handling, performance and stability without PI, Arduino

The system is stable and performs well.
An issue with delay when initializing test data: very long waiting time when loading data from past month -> might be problematic in real life scenario, when there will always be loaded all the data initially -> possible solution would be paging, which we did not used in our project.
Loading the dashboard when in the Database are too many data of measurements representing, also leads to a little longer waiting time as well.
Bug in absence calendar: when clicking on saving event multiple times it will be saved multiple times -> bug most likely from Primefaces. The bug could be fixed in the backend, but the overhead was too much.
Otherwise the performance of the system is well done, error tolerance is covered in the most of cases as well as in many edge cases to produce a stable system to work and to test.

4. Privacy

Prüfen Sie zumindest folgende Aspekte:

- *Sind Zugriffsrechte korrekt umgesetzt?*
- *Ist sichergestellt, dass spezifische Auswertungen und Auswertungszeiträume nur den dafür vorgesehenen Benutzergruppen zur Verfügung stehen?*

Privacy is given in form of notifications: "You do not have access to the requested resource.". Here was tried to access a website by manual typing the whole URL, where the accessibility is only given if the user has an admin of manager status. E.g., if a logged in user as Employee typed in http://localhost:8080/users/users.xhtml to get into the view of the list of all users won't be possible on that way.
Data Privacy when in an Office are between 1 and 4 persons at the moment, so that the measurement will not be saved. Saved measurements does not extract any information about the persons working in that office as well.
Viewing measurements for each Role is done also. In the wat that, the Administrator and the Facility Manager have access to the Global Dashboard, where they see the measurements of all Offices and all Public rooms.
The Manager (Department Manager) have access only to its department, so that user can only see the measurements from all Offices and Public rooms of its department.
And the Employees have a view of their own Office and all Public rooms of the Department they work.
The Administrator and the Facility Manager can view the list of all users, add new users, edit and delete, where the Manager have a view of all users of its Department only.

5. Usability

Wird das Gesamtkonzept des Systems den Bedürfnissen der adressierten Zielgruppe gerecht?

The Webapps is user-friendly and is good structured. The black background makes it easier to concentrate on the screen. The menu on the left stays so an easy switching between navigation points. To read the diagram, there is an acclimatization period, but that goes rather quickly.

6. Further Abnormalities

Führen Sie hier weitere Auffälligkeiten und noch zu leistende Arbeiten an.

Arduinos setup regard power loss. And shifting the editing from the limits from the pi code to the frontend (but as this limit are inspired by the AK and the official workplaces regulations, this limits shouldn't be altered all too often, as they should improve the workplace.
The design of Dashboard view could and should be improved.
Error messages could be more specific and clearer.
The changing of code to test the email sending of the chosen interval from the email notifications could be done in a better way as well, but in the way it works now it is more stable and performing better.
More logic from the controllers could be moved to the services.
The performance of the loading big amount of data from the database could be improved as well.