Progressive Web Apps (PWA) for YII Framework Enrichment

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Abstract
Framework YII is a high-performance, component-based PHP framework for large-scale Web application development. YII provides maximum reusability in web programming and is able to increase development speed significantly. The YII framework provides many advantages ranging from programming architecture using MVC concepts, ORM database management features, Form validation, authorization and authentication, caching, and more. However, So far framework YII does not provide features that make the website is installable and can be accessed offline. To create a website that is installable and can be accessed offline, then the framework YII will be added service worker and manifest. Manifest is a simple JSON file that gives users the ability to save bookmark sites to the home screen. While the service worker is a script that runs the browser in the background, separate from the web page, and does not require a web page or user interaction to run it. Technically, Service Worker provides script network proxies in web browsers to manage web / HTTP requests programmatically. The Service Worker is able to efficiently cache mechanisms and enable websites to be accessed offline. This study aims to implement service worker and manifest in YII 2 Basic template framework in progressive web app development.

Keywords: *Framework YII, Service Worker, Manifest Web App, Progressive Web App, Accessibility*

1. Introduction

PHP programming language is a very common programming language and is perfect for web development. PHP offers several advantages for developing dynamic web applications and integrated platforms with various popular platforms. Due to the popularity of PHP, there are many alternative PHP frameworks that are currently available [1].

The selection of the framework is an important step because the speed and quality of work depends on it. The main aspects to consider in choosing a framework are the context of use, licensing, software patterns, hosting requirements, ease of installation, core libraries, learning curves, DB and ORM abstractions, including JS libraries etc. [2]

Framework YII is a high performance, component-based PHP framework for large-scale Web application development. YII provides maximum reusability in web programming and is able to significantly improve developer speed. Framework YII provides many advantages ranging from programming architecture using MVC concepts, ORM database management features, Form validation, Widgets, Authentication and authorization, caching, logging, etc. [3].

In website development one aspect of things to note is the accessibility of a website. Accessibility by Indonesian dictionary is interpreted as accessible. Accessibility in the world of web allows everyone to enjoy the information contained in a site contained on the internet [4]. So, creating a website that is installable and can be accessed offline is also important to support the accessibility of the website. Currently in the framework YII is only available caching feature that makes the website lighter when accessed by users, and still can't be used to make websites installable on the device or capable of being accessed offline. However, now there is a technology called service worker that is able to support offline features on a website. By adding a service worker to the YII framework, making website accessible offline. While to make the website can be installed on the user's device, can use the web app manifest.

Service worker is a script that runs the browser in the background, separate from the web page, and does not require web pages or user interactions to run it [5]. Technically, Service Worker provides script network proxies in web browsers to manage web / HTTP requests programmatically. The Service Worker is located between networks and devices to complement the content. They are able to use the cache mechanism efficiently and allow error-free behavior during the offline period [6].

The Web App Manifest is a simple JSON file that gives developers the ability to control how apps are visible to users, direct what users can load, and define the look of the app when it launches [7]. The Web Application Manifest gives the user the ability to save a bookmark to the user's device home screen.

In this research will be implemented service worker and manifest web app on YII framework in making progressive web app, with the help of service worker make website can be accessed offline. Progressive Web App (PWA) was the first idea supported by Google Alex Russell engineer in June 2015 [7]. Progressive Web App combines the best experience of web and applications. PWA does not require any installation, the word "progressive" comes from the relationships created by the user with the application from time to time. Application is quickly loaded, even when the user is on a bad network [5][8]. The Service Worker itself is one of the PWA technologies with a mechanism to control the cached assets and provide a customized offline user experience for the user.

In research conducted Falix Albertos Marco, et al. The User Interaction with Offline Web Application: A Case Study, resulted in the conclusion that user satisfaction on the website application without offline proxy of 66.5 indicates users are not satisfied with the system, while user satisfaction when using offline proxy of 95.5 indicating the user is very satisfied with the system which supports offline proxy [9].

In a study conducted by Granodio Daegal Wibowo that implements PWA on the development of Quality Management Information System (SIMUTU), it produces a SIMUTU mobile web application that is lighter, faster, responsive features, to high-level security capabilities and is capable of being accessed offline [10]. While in research conducted by Dr. V. Karpagam, et al. The Performance Enhancement of Webpage Using Progressive Web App Features, led to the conclusion that with PWA will increase traditional web pages to be fast, reliable, and interesting. The added web page service worker can work offline, assist in push notification feature and create icon on the desktop so as to give experience like application [7]. In another study conducted by Rahul Surendra Mishra who reviewed the progressive web app with the conclusion that PWA can be loaded quickly even when the user is in a bad internet network connection [5].

The purpose of this research is how to implement service worker and manifest web app in progressive web app development using framework YII 2 basic template. So, that website have ability can be accessed offline and is installable.

2. Research Method

Stages Research starts from conducting literature studies by looking for journals and articles related to this research. The results of literature studies will be used as a reference in conducting this research. Followed by installation of framework YII 2 basic template which will be used as research object. in the next stage added features service worker and manifest web app on YII framework that has been installed in the previous stage. Results after the addition of features will be tested at the next stage of the results and discussion stage. The last stage is done by making research conclusions based on test results that have been done in the previous stage. Figure 1 shows an overview of the research chronology used in this study.
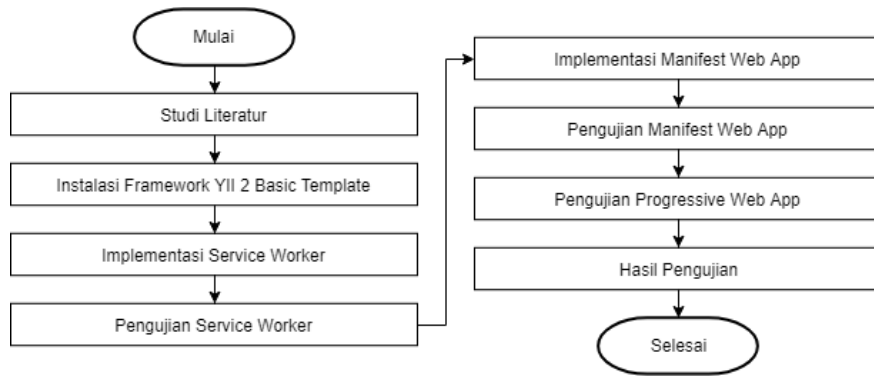
Figure 1. Research Chronology

2.1. Study Literature

The literature study is the process of seeking and obtaining the basic reference of relevant theory to support the research. The basic reference of this theory is obtained from various sources ie journals, books, theses, as well as official website related to the topic of Framework YII, Progressive web app, Service Worker, Web App Manifest, and PWA testing

2.2. Framework YII
2.2.1. Installation of Framework YII

Framework YII used in this research is Framework YII 2 with basic template. Installation is done by downloading archive file Framework YII 2 with basic template which have been provided by official website of YII Framework and can be downloaded at https://github.com/yiisoft/yii2/releases/download/2.0.15/yii-basic-app2.0.15.tgz.   Before extracting the downloaded files, a local server is required to execute the YII framework. The local server used in this study is xampp which can be downloaded at https://www.apachefriends.org/xamppfiles/7.2.3/xampp-win32-7.2.3-0-VC15-installer.exe.

Then extract the downloaded framework YII into the htdocs folder located in xampp. After the installation is complete, verify the installation by running the "php yii serve" command at the command prompt while in the project web directory. The YII 2 basic template framework has provided some features such as login and register so that it needs to have database migration in order for the feature to work properly.

2.3. Service Worker
2.3.1. Implementation of Service Worker

At this stage the service worker is implemented on the YII framework that has been installed in the previous stage. The Service Worker itself is one of PWA technologies with mechanisms to control the cached assets and provide custom requests to the network so as to provide an offline user experience for users [10]. In the graph below shows the results of the service worker implementation on the website where the service worker is registered and active and running well in the browser.
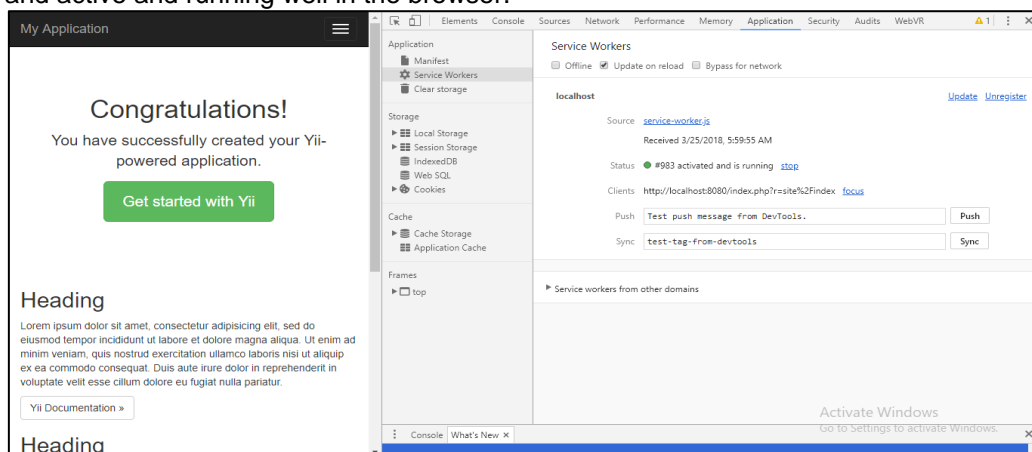

Figure 2. Implementation of service worker on YII framework 2 basic template

2.3.2. Testing of Service Worker

At this stage testing on the service worker that has been implemented in the YII framework in the previous stage. testing is performed to find out if the service worker is registered and working properly. In the picture below (figure 3) shows the process of visits to the website with offline state with website results can be accessed offline without any problems.
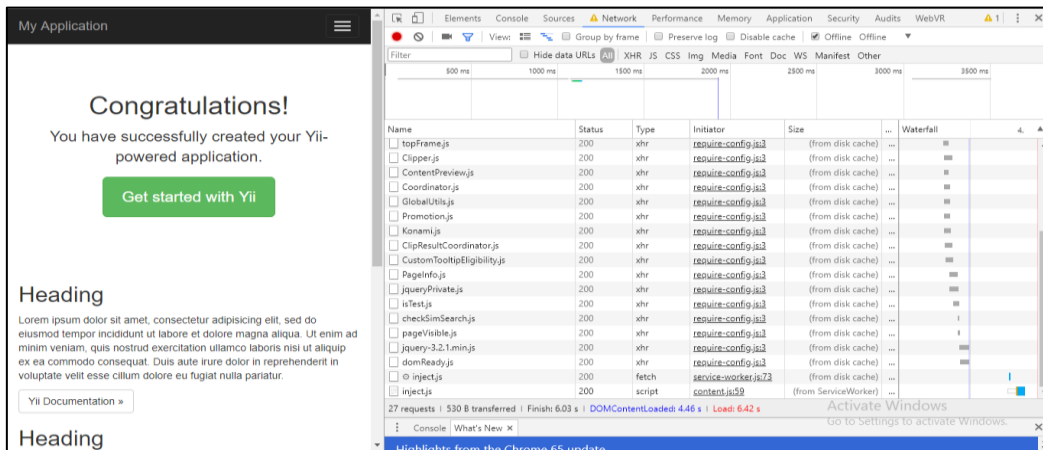

Figure 3. Testing on website with offline status

2.4. Manifest Web App
2.4.1. Implementation of Manifest Web App

At this stage it is implemented Web app manifest on the YII framework that has been installed in the previous stage. The Web App Manifest is a simple JSON file that gives developers the ability to control how apps are visible to users, direct what users can load, and define the look of the app when it launches [7]. The Web App Manifest gives you the ability to save your site's bookmarks to your device's home screen. In the picture below shows the results of web app manifest implementation on the framework YII 2 basic template.
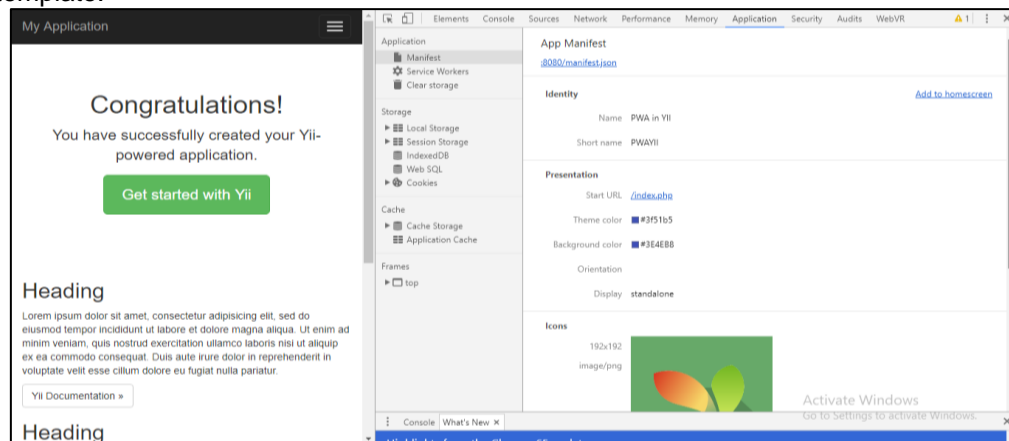

Figure 4. Implementation of web app manifest on YII framework 2 basic template

2.4.2. Testing of Manifest Web App

In this stage testing is performed on the manifest that has been implemented in the YII framework in the previous stage. testing is done to see if the manifest works well. In the picture below shows the process of add to home screen with the result that the manifest has works well so that the website can be installed on the home screen device.
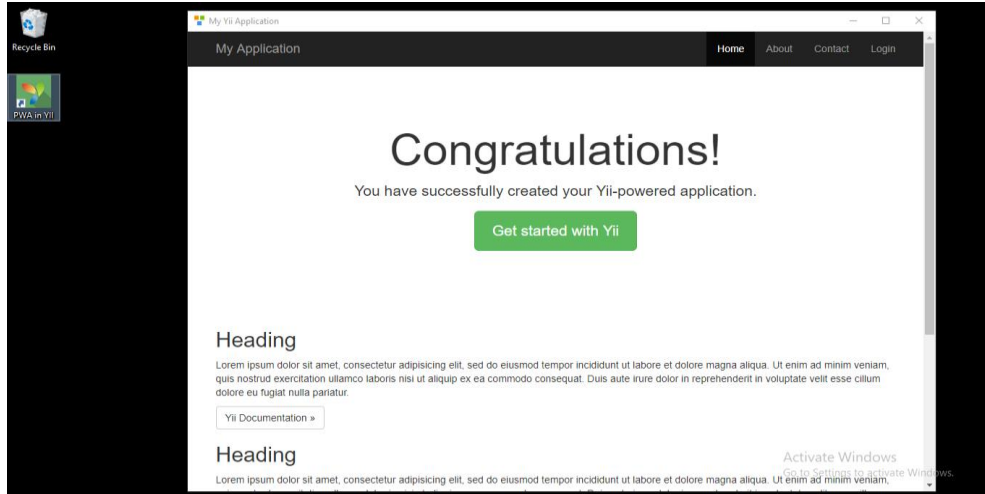
Figure 5. Testing website with process add to home screen

2.5. Progressive Web App
2.5.1. Testing of Progressive Web App

At this stage the final test using lighthouse tools to the website, to determine the percentage change in PWA level on the website and the level of accessibility on the website. In the picture below shows the test results before the addition of service worker features and manifest web app on the website.
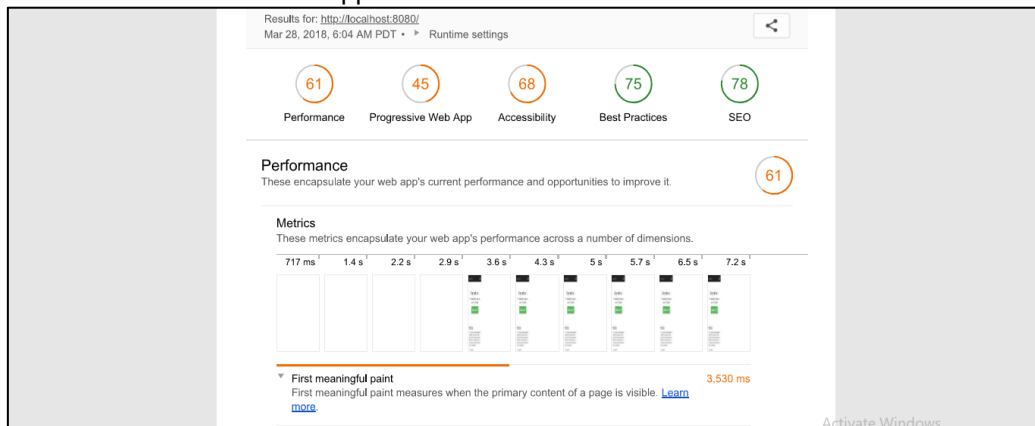

Figure 6. Test result before addition of service worker and manifest web app

In the picture below shows the results after the addition of service worker features and manifest web app on the website
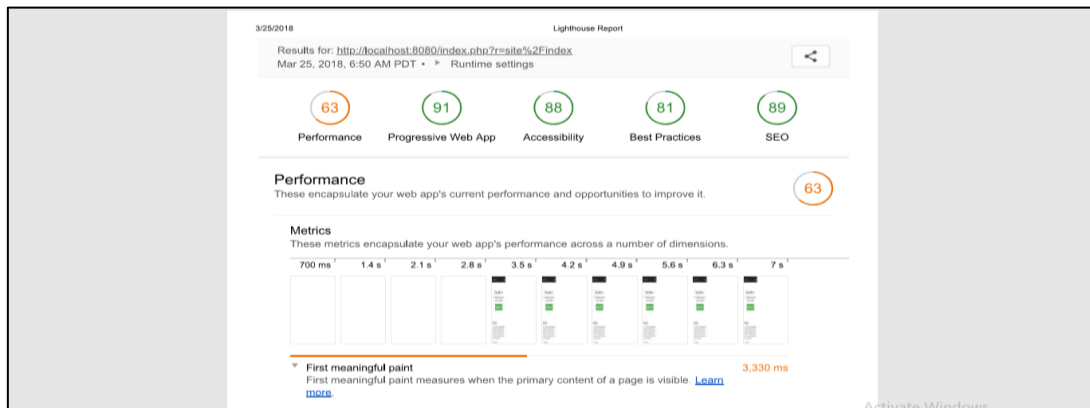

Figure 7. Test result after addition of service worker and manifest web app

3. Results and Analysis

Results and discussion in this study started from testing the website before and after the addition of service worker and manifest web app. Testing is done using Lighthouse tools v2.9.2. In the picture below shows the results of the YII basic framework testing before the addition of service worker and web app manifest.

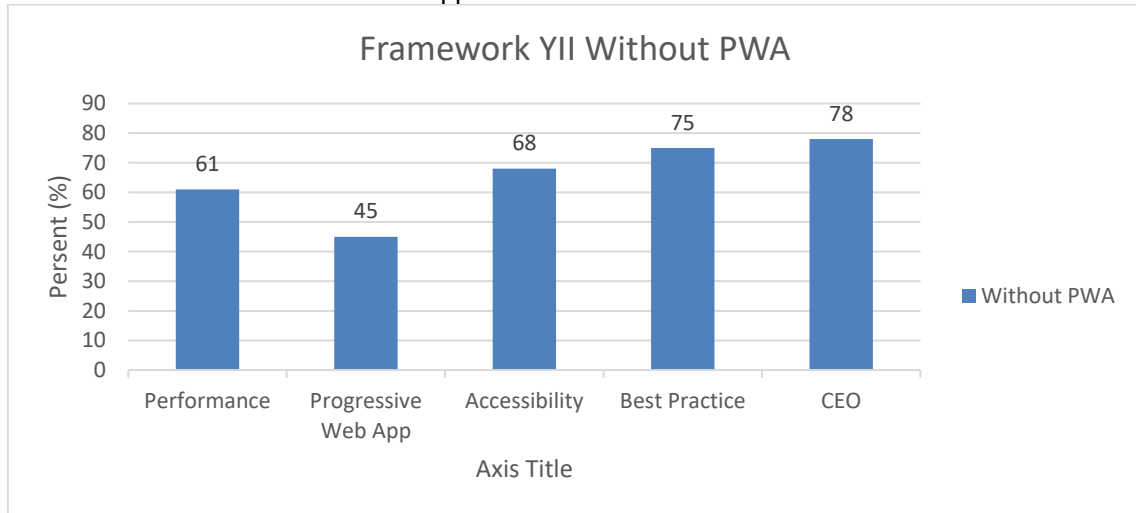**Framework YII Without PWA**

Figure 8. Graph of test result before adding feature

In the picture below shows the results of testing YII basic framework with the addition of service worker and web app manifest.
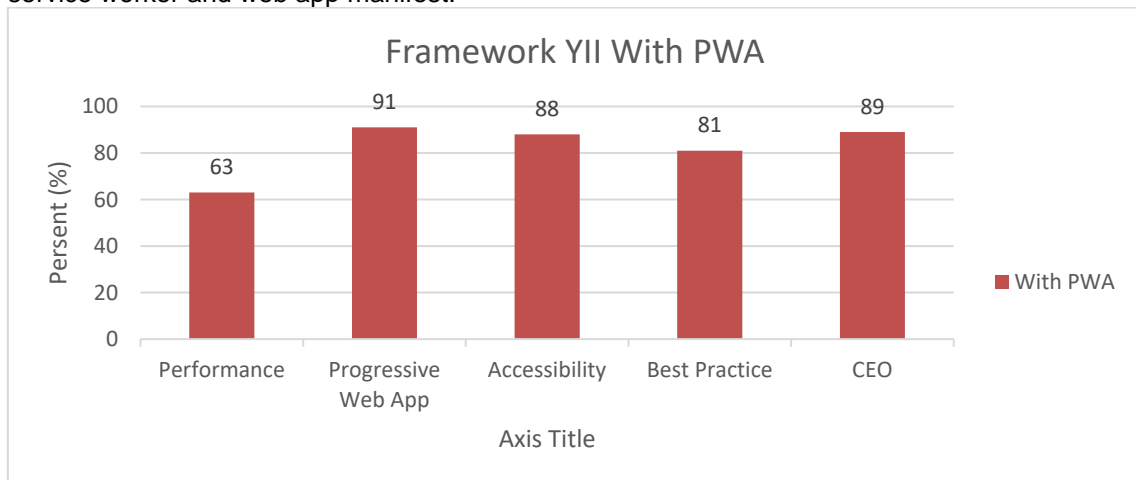
Framework YII With PWA

Figure 9. Graph of test result after adding feature

YII framework test results before additions and after addition of service worker and manifest web app compared to know the increase of percentage of Accessibility and PWA from the website. The figure below shows the comparison before and after the addition of service worker and manifest on the website.

Table 1. Comparison of test results

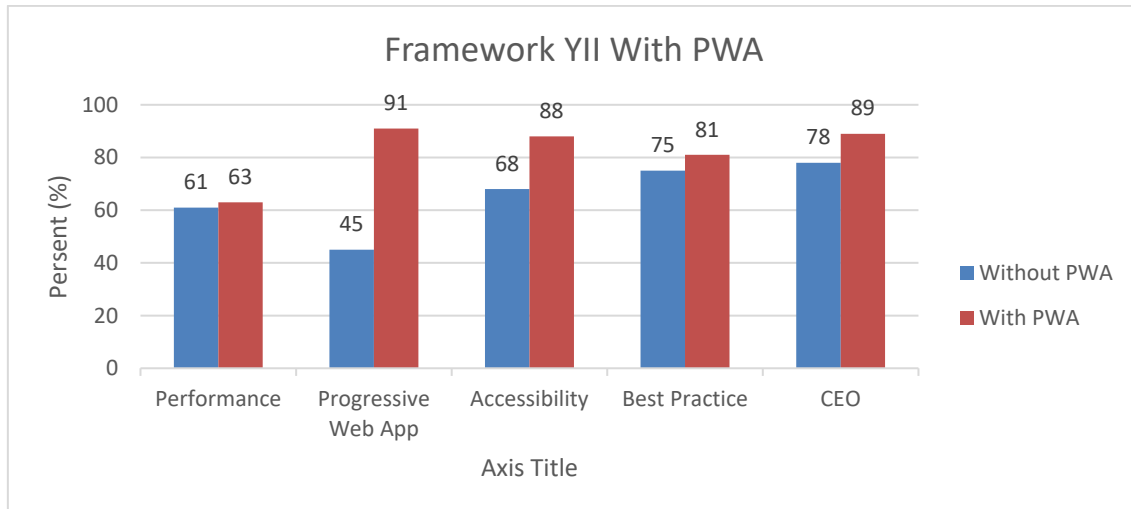|	Without PWA	With PWA
Performance	61	63
Progressive Web App	45	91
Accessibility	68	88
Best Practice	75	81
CEO	78	89

Figure 10. Comparison graph of test result before and after feature addition

4. Conclusion

Based on the results of tests that have been done by the author using light-house tools, can be obtained some conclusions, among others:

1. Implementation of Manifest on framework YII works well, make website can be added to home screen.
2. Implementation of Service Worker on YII framework runs well, making the website can be accessed offline.
3. From the test results using lighthouse tools can be concluded that the website already contains 91% progressive web app.
4. From the test results using lighthouse tools also obtained level of website accessibility is 88%, which states that the accessibility of the website is good.

Some suggestions are useful in the development of the next system among others:

1. Added push notification feature which is not included in the feature provided by YII framework

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