

Web application of movie catalogue with React

Zlatin Zlatinov^{1*} and Nadezhda Angelova¹

¹Trakia university, Faculty of Economics, 6000 Stara Zagora, Bulgaria

Abstract. In modern digital society, the requirements for digital services applies its influence in developing new tools for building web applications. One of those tools is React, an open-source front-end library for creating user interface (UI) for websites and web applications with responsive design. Proof of the popularity and the advantages of React is the number of websites and web applications, which use it (according to the statistics, they are more than 11 million). The aim of the article is to reveal the main characteristics and advantages of React technology by comparison with another web tool Angular and, to present a web application for movie catalogue, developed with JavaScript and React library. It consists of Home page, Catalogue page (movies), About Page, Login page, Register page, and a Sign-out button. Main functionalities: non-register users (guests) can only view the page. A guest can register as a new user or login if it is already registered. The users can create new elements (movie publication), edit or delete their own publication. If a user is not an owner of the publication, they can comment or like other user's publications.

1 Introduction

Internet technologies are closely related to the rapid development of computer and communication technologies. The evolution of web technologies goes through different stages reflecting the dynamics in accordance with the needs and requirements of the users. The first generation Web 1.0 is associated with the concept of hypertext documents and the use of HTML, where pages are static. Web 2.0 provides opportunities for user-generated content and the role of social communities, sharing and participation. Web 3.0 is based on decentralization and artificial intelligence so that machines can understand information like humans and make connections, so it is also known as the semantic web. [1]. In recent years, many authors introduce the new web generation Web 4.0 as an Ultra-Intelligent Electronic Agent, symbiotic web and Ubiquitous web [2]. This evolution in web generations also requires a change in the technologies that are used for creating web content and improve user experience and interaction. Starting from HTML, CSS, JavaScript, and goes to Typescript, Angular, Node.js, React and many more.

One of the web technologies, gaining popularity in recent years, is React. The purpose of the article is to present its main functionalities by comparing it with another powerful technology Angular and to show how React could be used in developing a web application of movies catalogue.

* Corresponding author: zlatin.zlatinov.22@trakia-uni.bg

2 Web technologies React and Angular

2.1 React – basic characteristics and functionalities

React is an open-source library for developing interactive UI (user interface). It can be used for creating SPA (Single Page Applications) and also for mobile applications with ReactNative [3]. It was originally created by Facebook (Meta) team and was officially released in 2013. React uses component-based architecture and every single component has its own logic and functionalities. This allows having an easier code to maintain with better structure. The library uses Virtual DOM (Document Object Model), which makes it incredibly fast and improves the UX (user experience) [4]. It also uses One-Way Data Bindig or the process that establishes connection between the interface and the data in one direction [5].

Popularity: According to Stack Overflow survey for 2023 [6] React holds first place for the most used library among 56 724 professional developers voted, shown on Figure 1. and on second place of 71 802 total participants in the survey. According to NPM trends [7], React has on average 15 million downloads per month and more than 210 thousand stars on GitHub.

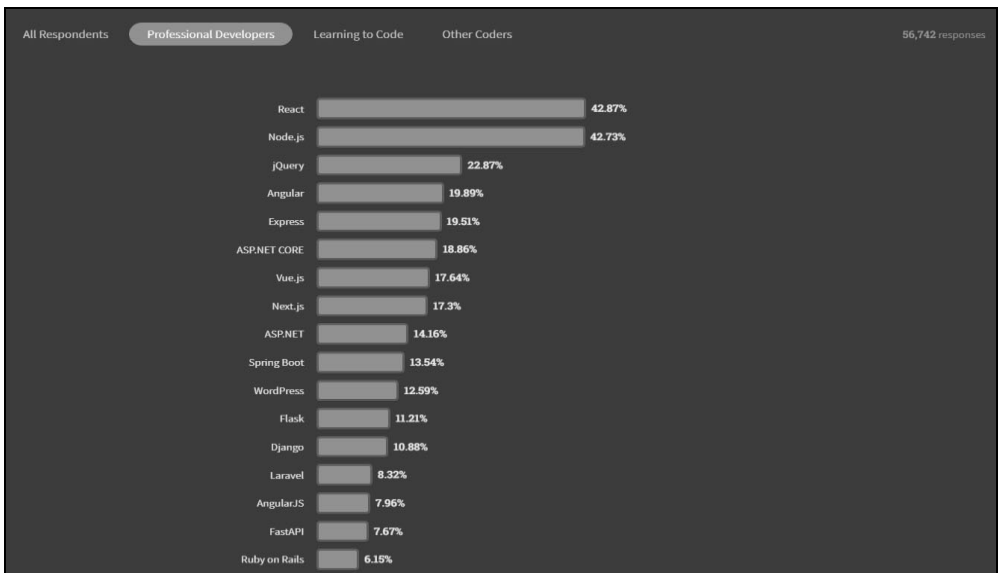


Fig. 1. Stack Overflow survey [6]

Usage: Being created by Facebook (Meta), React is mainly used for developing their own brand applications, but also other big companies such as Airbnb, Netflix, Pinterest, Slac, Udemy use it [8,9]. Of course this does not mean that those companies use only that specific technology, it means that it takes big place in their front-end applications. According to “Built With” website [10], more than 11 million sites around the world use React.

Syntax, complexity: Although React is quite popular tool it is just a library, but with combination with other libraries, such as ReactRouter [11] for routing, Redux [12] for state management, React-auth-kit [13] for authentication, React becomes very powerful tool. The downside is that those libraries are not maintained by Facebook but from third parties, which makes them insecure and in case of change in some of them, you might need to make big changes in your source code.

React is written in JavaScript, but applications could also be written in TypeScript [14] (superset of JavaScript). This makes it easier for junior developers, but also for the startups who need something fast, easy to understand and maintain.

2.2 Angular - basic characteristics and functionalities

Angular is an open-source framework for creating UI. It was officially released in 2009 by Google team, the framework was named AngularJS and written in JavaScript. But in 2016 a new version was released under the name Angular 2.0 [15] or for short just Angular, which was entirely re-written in TypeScript. At the end of 2021, Google announced that they officially stop the support of AngularJS [9].

According to some professionals in the field [8], Angular could be referred as a platform, because of the great variety of tools, libraries and functionalities that are built-in in the framework. It has libraries for routing, handling HTTP requests, state management with Zone.js [16], RxJS [17] – library that uses observables for event-handlers and asynchronous functions and many others. The developers follow the MVC (Model View Controller) pattern, which means that the code can be separated in logical parts (modules), with their own components and functionalities, which helps the separation of responsibilities [8].

Angular has CLI (command-line interface), that makes the job easier for the developers. With the help of TypeScript, the probability of human errors is decreased. With the framework can be developed not only SPA, but also and PWA (Progressive Web Applications) and server-side rendering [18]. Angular uses Two-Way Data Binding [5], which means that Angular automatically checks for data changes, by providing consistent data between the module and the view in two directions. With the help of the great number of pre-built libraries in the framework, this makes it a great tool for developing complex applications for the corporations.

Popularity: According to Stack Overflow survey for 2023 [6], Angular is on 4-th place in most used tools for developing web applications among 56 724 professional developers and on 5-th place in total 71 802 participants. According to NPM Trends [7] Angular has around 60 thousand stars on GitHub and only 2 million downloads monthly.

Usage: Angular is not only popular in the applications, developed by the Google team, but also in companies such as Forbes, Cisco, General Motors, PayPal, Telegram, Deutsche Bank and others [8, 9]. Again, this framework is not in the core of their software, but it definitely takes a huge part in their applications.

Syntax, complexity: Even though low statistics numbers, Angular does not lose its popularity. In fact, it keeps being a reliable tool for developing complex and expensive applications and with the help of TypeScript the number of human errors across the developers is being significantly reduced. But on the other hand, because of its complexity and the long learning curve of the framework, comes its downside – not being preferred by junior developers.

Angular uses the regular DOM (Document Object model) [18], which means that has to walk the entire tree to find a component, and to re-render it again with the new changes. But because of the work of Zone.js, this hard process is made easier. According to the official documentation of Angular [15], “*Zone.js is a signaling mechanism that Angular uses to detect when an application state might have changed. It captures asynchronous operations like setTimeout, network requests, and event listeners.*”. In other words, Zone.js has to signalize for event changes and if there are some, the tree should be re-rendered.

2.3 Results of the comparison

Comparing the performance of React and Angular is difficult, in many cases identical applications, written with the two technologies work absolutely the same for the normal user.

The difference comes how developers implement the logic, because they follow the best practices for better performance. The advantages of React is that it uses the Virtual DOM and Angular uses the regular DOM.

Other key difference is the size. React has size of 316kB unzipped and also developers have the ability to choose which library to use. But this also can be a disadvantage because developers and sometimes the entire team will need to learn the new library and how it works.

3 Web application of movies catalogue using React

As proof of evidence for the vast usage of React, an application for movies catalogue was developed. The application follows the component-based architecture, which is the most common pattern. Every single component has its own functionality and can be reused in many parts of the application, depending of the needs. This allows the code to be separated into different files so that it can be easier to maintain.

The components for the page navigation are impored in the main component **App.js**. There is implemented logic, which prohibits already logged-in users to have access to the login and register page.

The component for homepage (**MovieSlider**) has a carousel, which visualizes a list of trending movies and is shown on Figure 2. A request to foreign API (TheMoviesDataBase [19]) is made, from where data of the movies is taken. In case of error, an empty array is returned and data is not being visualized on the homepage.

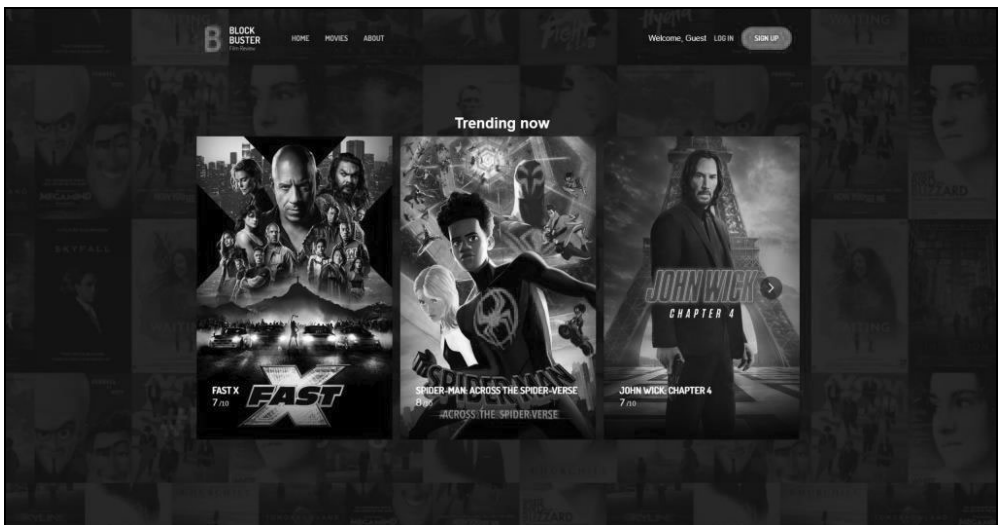


Fig. 2. Movie catalogue home page

The **About** component is static, it has no logic inside, it only returns a specific view.

The **MovieList** component has complex logic, it also has child components, but the main purpose is to require data for the movies from our server and to show them on the page. In case of error, an empty array is returned and no data is visualized. By the time of the request a **Preloader** component is displayed and after the successful response, the data for the movies can be shown. It also checks for logged user and if there is not, the **Advertisement** components is displayed, but if there is already logged user, the **CreateForm** component is

visible (the field for adding a new movie to the list). There is a logic for searching a movie, and also for page pagination with 5 or 10 movies per page, which can be changed by the user.

The **MovieDetails** component also has a complex logic, where a detailed information for the movie is displayed (Figure 3). A request to our server is made according to the unique id-number of the movie and its comments, if there are. In case of error, a **404 NotFound** component is displayed. In case of success the component checks if there is logged user, and if there is not, the guest can only see the information about the movie. Logged users can like or comment the movie. If the user is owner of the publication (in this case the movie) he can only see the comments and can not like his own publication, but he can open the **EditComponent** field and edit the information or to delete the entire movie.

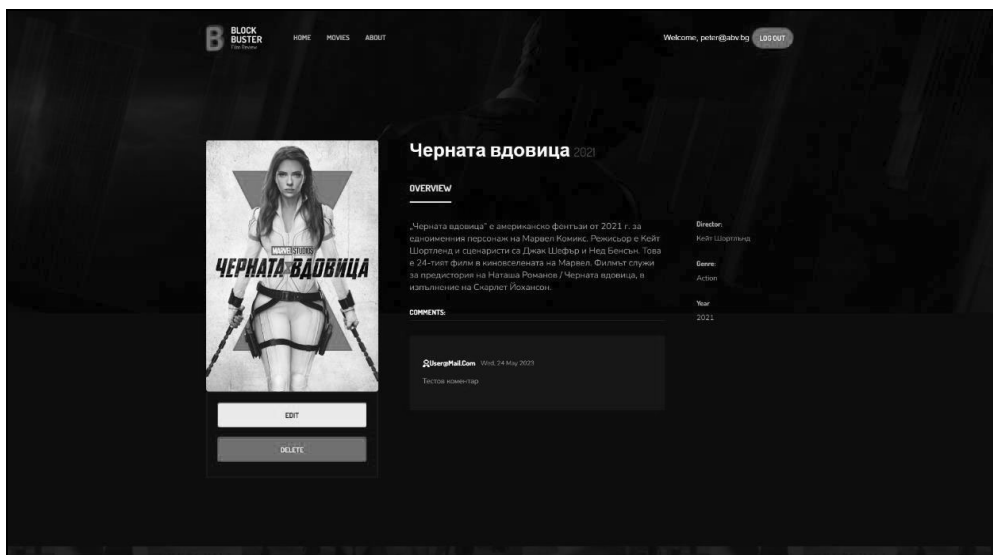


Fig. 3. Movie details (logged user, owner)

The components for login and register are almost identical. There is implemented logic for data validation on the client and the server, and functionalities for error handling. When registering a new user, it is displayed the **Register** component which is a form with email input field, password and confirm password fields. If data is correct, a request is sent to the server, which also makes data validation. If it is successful, our data is saved in our database. After that, the server returns a response with the user credentials and the user is redirected to the homepage. In case of incorrect data, a proper error field is displayed.

Components for creating and editing (**CreateForm** / **EditComponent**) are almost the same, both are forms for creating or editing a movie. There is also data validation on the client and the server and if it is incorrect a proper error field is shown. Only owners can edit their own publications.

The **MovieComment**, which is a child component to **MovieDetails**, is used for commenting a movie, and to display other comments. Only registered users, who are not owners of the publication, can write a comment.

Additional services **commentsService**, **moviesService**, **likesService**, **userService** are used for handling requests and responses between the client and the server, respectively for comments, movies, likes and users. Utility functions such as **movieDataValidation** and **userDataValidation** validate the data from the forms for registering a new user or creating or editing a movie.

4 Conclusion

Despite the big differences between React and Angular and the question if we can even compare a library with a framework, the main idea for those tools is to create a user interface. Actually, each of them has more than 10 years' history, which has proved their reliability and everyone of them has its applications in different areas. Even though Angular is not that popular among developers, the statistics show that it is being a consistent and reliable tool through the years. React on the other side, does not fall behind, proving that can be used for both small applications and big ones such as Facebook and Netflix. And last but not least, according to the provided information and statistics in the last 5 years, React's popularity and usage continues to increase as it can be seen on Figure 4.

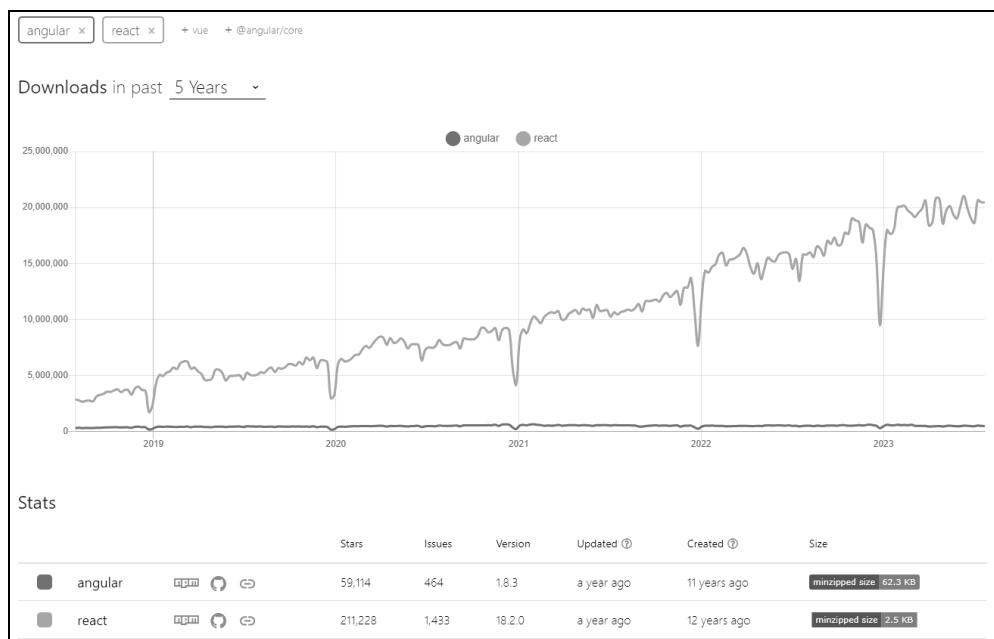


Fig. 4. NPM Trends [7]

Analysis and score for the performance for both tools could hardly be made, because data in real world could be affected by many factors, such as the level of experience and the way a team works. For example, not everyone is used to work with many different technologies together. But thanks to the best practices and tools that modern developers use the chance an application to stop or in spoken language to “break” is the lowest one. They also try to provide the best performance for the application, so that the user cannot experience some disturbance. The decision which technology to use lays in the hands of developers and the entire team. They choose to use the proper technology according to the situation and the requirements of the software.

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Link to the source code of the project on GitHub:

<https://github.com/ZlatinZlatinov/React-Movies>

Link with video demonstration: <https://www.youtube.com/watch?v=yYy0S44OdcU>

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