B. P. PODDAR INSTITUTTE OF MANAGEMENT AND TECHNOLOGY

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

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INTERNSHIP PROGRAM

PROJECT TITLE: ONLINE SCREENING PORTAL FOR ON-BOARDING ASSOCIATES

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AIM OF THE PROJECT

To successfully develop an examination portal that would aid a department to screen new associates joining the department with an automated knowledge testing portal.

Normally, there are many candidates to be screened, and screening a lot of candidates poses a problem to the employees as they have to take out time from their daily schedules to screen those candidates and hence sometimes have to compromise on their deliverables.

To mitigate the above issue, we need to have an application which provides a platform to do the first round of screening. The candidates can register themselves, select their own skills and give an exam based on the skills they have selected. The screening result would then depend on the marks that the candidates get as part of this process.

PROJECT OVERVIEW

In this project we aim to develop an examination portal such that the new associates aspiring to join the department can be screened using the portal.

This helps the department with a ready-made testing portal rather than conducting telephonic or in-person technical interviews thus reducing the time required for screening each and every candidate.

The portal is aimed to be a single page web application with 4 segments.

The segments are as follows:

- HOME PAGE
- REGISTRATION
- TECHNOLOGY CHOICE FOR CONDUCTING EXAM
- EXAM INSTRUCTION
- TIME RESTRICTED EXAM PAGE.
- ADMIN DASHBOARD

Whenever a candidate registers, their credentials are to be stored in a database and then later be validated while they opt for the test.

The test page would be such that it allows a candidate to toggle between questions and for each candidate the set of questions would be randomized.

There are 3 divisions (based on difficulty level) to be made within the questions categorized as:

- EASY
- MEDIUM
- HARD

And accordingly the marks would be associated with them.

This application makes use of react-redux on the front end and uses Node-js to establish database connectivity. Here we would make use of SQL server 2017.

METHODOLOGY FOLLOWED

In this project we have followed agile methodology

AGILE SOFTWARE DEVELOPMENT is an approach to software development under which

requirements and solutions evolve through the collaborative effort of self-organizing and cross functional teams and their customer(s)/end user(s). it advocates adaptive planning, evolutionary development, empirical knowledge, and continual improvement, and it encourages rapid and flexible response to change.

The term agile (sometimes written agile) was popularized, in this context, by the manifesto for agile software development. the values and principles espoused in this manifesto were derived from and underpin a broad range of software development frameworks, including scrum and kanban.

There is significant anecdotal evidence that adopting agile practices and values improves the agility of software professionals, teams and organizations; however, some empirical studies have found no scientific evidence.

AGILE SOFTWARE DEVELOPMENT PRINCIPLES

The manifesto for agile software development is based on twelve principles:

1. Customer satisfaction by early and continuous delivery of valuable software.
2. Welcome changing requirements, even in late development.
3. Deliver working software frequently (weeks rather than months)
4. Close, daily cooperation between business people and developers
5. Projects are built around motivated individuals, who should be trusted
6. Face-to-face conversation is the best form of communication (co-location)
7. Working software is the primary measure of progress

8. Sustainable development, able to maintain a constant pace
9. Continuous attention to technical excellence and good design
10. Simplicity—the art of maximizing the amount of work not done—is essential
11. Best architectures, requirements, and designs emerge from self-organizing teams
12. Regularly, the team reflects on how to become more effective, and adjusts accordingly

FEATURES OF AGILE PRINCIPLES:

ITERATIVE, INCREMENTAL AND EVOLUTIONARY

Most agile development methods break product development work into small increments that minimize the amount of up-front planning and design. iterations, or sprints, are short time frames (time-boxed) that typically last from one to four weeks. each iteration involves a cross-functional team working in all functions: planning, analysis, design, coding, unit testing, and acceptance testing. at the end of the iteration a working product is demonstrated to stakeholders. this minimizes overall risk and allows the product to adapt to changes quickly. an iteration might not add enough functionality to warrant a market release, but the goal is to have an available release (with minimal bugs) at the end of each iteration. multiple iterations might be required to release a product or new features. working software is the primary measure of progress.

EFFICIENT AND FACE-TO-FACE COMMUNICATION

The principle of co-location is that co-workers on the same team should be situated together to better establish the identity as a team and to improve communication. this enables face-to-face interaction, ideally in front of a whiteboard, that reduces the cycle time typically taken when questions and answers are mediated through phone, persistent chat, wiki, or email.

no matter which development method is followed, every team should include a customer representative ("product owner" in scrum). this person is agreed by stakeholders to act on their behalf and makes a personal commitment to being available for developers to answer questions throughout the iteration. at the end of each iteration, stakeholders and the customer

representative review progress and re-evaluate priorities with a view to optimizing the return on investment (ROI) and ensuring alignment with customer needs and company goals.

in agile software development, an **information radiator** is a (normally large) physical display located prominently near the development team, where passers-by can see it. it presents an up-to date summary of the product development status. a build light indicator may also be used to inform a team about the current status of their product development.

VERY SHORT FEEDBACK LOOP AND ADAPTATION CYCLE

A common characteristic in agile software development is the daily stand-up (also known as the daily scrum). in a brief session, team members report to each other what they did the previous day toward their team's iteration goal, what they intend to do today toward the goal, and any roadblocks or impediments they can see to the goal.

QUALITY FOCUS

Specific tools and techniques, such as continuous integration, automated unit testing, pair programming, test-driven development, design patterns, behavior-driven development, domain driven, code refactoring and other techniques are often used to improve quality and enhance product development agility. this is predicated on designing and building quality in from the beginning and being able to demonstrate software for customers at any point, or at least at the end of every iteration.

DETAILED PROJECT DESCRIPTION

The project is divided into two segments. They are as follows:

- Admin Login
- Candidate Login

Admin Login

We have a designed a separate database table that consists of Admin ID and their Login credentials.

Whenever an individual wants to sign up as admin, his/her credentials are validated to give them access to admin functionalities.

Admin functionalities involve the following:

- Adding questions under different technology stacks
- Changing the overall exam time
- Changing the overall marks for the exam
- Adding a new admin
- Changing his/her password
- Changing the technologies in which a candidate appears for exam (adding more options/removing options)

Let's discuss each functionality in detail:

- **Adding questions under different technology stacks**

  In this section the admin can add questions under each skill. He / She has to add the question followed by the 3 options and a correct answer. He / She also needs to tag the question to the correct skill and the provide the marks allotted to that questions.

Once they click on the submit button the options are reshuffled using an algorithm at the back-end and are entered into the database.

- **Changing overall Exam time**

In this section the admin can change the overall time allocated for the exam. Initially the exam time is kept fixed to 3hrs but he/she can adjust the time according to the need.

- **Changing overall marks**

In this section the overall marks of the exam can be changed by the admin.

- **Adding a new admin**

In this section the admin can add new admins for the portal. Any existing admin can provide the username / admin Id and password as register the new admin

- **Changing Password**

In this section the admin can change/update his/her password. They first have to enter their current password. If it's valid then only their password would be updated based on what they have provided as the new password.

- **Changing the technologies / skills on which a candidate appears for exam (adding more options/removing options)**

In this section the admin can change the technologies in which a candidate can appear by adding or removing technologies. Also the previously selected technologies would appear such that the admin can see them and it helps in his decision making.

Candidate Login

This is the part which gives the employees access to give their examinations.

The various functionalities involve:

- Personal Details registration
- Skills Choice
- Instructions (consists of all the information about the exam)
- Examination Portal
- Summery Page
- Edit Details/Skill Choice

Let’s discuss the functionalities all one by one:

- **Personal Details registration**

  After successful login the employee would be redirected to the "Personal Details” page where he/she needs to enter basic information including name, mail ID, Experience however the Employee ID field would come pre-filled.

  After submission we do check every field whether it follows the correct pattern or not and after validating he/she has an option to either Edit the details or go for skills registration.

- **Skills Choice**

  In this page the employee can select from the various skills that the admin has set previously. He / She must select at least one skill in order to complete the registration process.

  After successful registration he/she would have a chance to edit the personal details as well as can change the skills previously selected by him.

❖ Instructions

This page consists of all the instructions regarding the exam.

Its consists of the following:

1. Total time
2. Total questions
3. Marks distribution
4. Negative Marking
5. Button color codes (Green - Answered, Violet – Marked for review, Grey – Un-answered)

After reading all these instructions he/she can finally go to our test portal to give the exam

❖ Exam Portal

This is the page which consists of the questions as per the skills chosen by the candidate. There is a timer which indicates the time after which the exam would be over. The time for the timer and the number of questions can be set/changed by the admin. There are also numbered buttons which can navigate the candidate to the respective question number.

If a candidate answers a question the button turns green. He / She also has the facility to mark the question for review and unmark it at any point in the exam. On marking it for review the button turns violet and on un-marking the button turns grey.

There are two ways the exam can conclude. Firstly, the candidate can end the exam by hitting the ‘Submit’ button, and confirming the submission. Secondly, the exam concludes when the time runs out (i.e. the timer goes to 00:00:00). In both these cases the candidate would be redirected to the summary page.

❖ **Summary**

This page consists of the entire exam summary.

The contents are:

1. Number of answered questions
2. Number of un-answered questions
3. The total marks scored
4. Total number of correct answers and wrong answers

❖ **Edit Details/Skills**

If at any point before going into giving the exam the candidate feels that they need to edit their personal details or skills, they may do so and as per their last response their details would be updated.

Initially our web-app has only the home navigation visible and the other navigation routes would become visible as and when the candidate requests for them (e.g., during the details registration the registration tab would become visible). But once the exam starts all these navigation links would disappear hence disabling the candidate from navigating to any other section while giving the exam.

TECHNOLOGIES USED

❖ REACT JS

REACT.JS is one such javascript library that has achieved massive popularity within the domain of online, web-based businesses and that too for a perfectly good reason. the one thing that it does exceptionally well—carve out great looking user interfaces (ui). with the principle that html and javascript are bound to collaborate side-by-side, react was created with a business-forward mindset by leveraging faster web-page load speed, seo friendliness and code reusability through combining the two technologies.

top companies are truly enamored by react's capabilities on a business stand point. the list of companies utilizing react in production is there to prove it, just to name a few: **Facebook, Instagram, Netflix, Whatsapp, Salesforce, Uber, The New York Times, Cnn, Dropbox, Dailymotion, Imdb, Venmo, And Reddit** are the major league ones among the 100+ other medium to large scale companies.

❖ REDUX

REDUX is a state management tool for javascript applications. while it is frequently used with react, it is compatible with many other react-like frameworks such as preact and inferno as well as angular and even just plain javascript. the main concept behind redux is that the entire state of an application is stored in one central location. each component of an application can have direct access to the state of the application without having to send props down to child components or using callback functions to send data back up to a parent.

If you read about redux, you'll see several benefits that are commonly discussed:

- **PREDICTABLE STATE UPDATES** make it easier to understand how the data flow works in the application
- The use of **"PURE" REDUCER FUNCTIONS** makes logic easier to test, and enables useful features like "time-travel debugging".
- **CENTRALIZING THE STATE** makes it easier to implement things like logging changes to the data, or persisting data between page refreshes

In addition to those general benefits, redux provides some advantages to maintaining state in a react application.

❖ JAVASCRIPT(ES6)

ES6 is the 6th edition of ecmascript, standardized in 2015. it brings many engrossing features that were not seen in previous versions like es5. for instance, let and const, they are blocked scoped declarations and thus not prone to the common errors caused by misunderstanding.

ES5 gives much space for these misunderstandings due to lack of basic language features.
that is the reason it drives many developers crazy. as such, several workarounds have emerged. typescript is very popular in the .net world (and here at wintellect) and coffeescript is a kind of a big deal in the ruby community. both typescript and coffeescript provide syntactic sugar on top of es5 and then are transcompiled into es5 compliant javascript.

ES6 X-FACTOR-

ES6 is different because it introduces new syntax, which was a needed transformation/ extension in javascript. this would definitely help to meet the demands of complex applications written in javascript. let us go through the features that has given edge to ES6:

ARROWS

ARROWS are a function shorthand using the => syntax. there is a similarity between the syntactical features of c#, java 8, coffeescript and es6. both statement block bodies and expression bodies are supported by them, which return the value of expression. unlike functions, arrows share the same lexical this as their surrounding code.

CLASSES

In ES6, having a single conducive declarative pattern makes class patterns painless thing to use and boosts interoperability. they are a simple sugar over the prototype-based oo pattern. inheritance, instance and static methods are supported by classes which makes es6 more amiable version of javascript.

ENHANCED OBJECT LITERALS

Purpose of object literals is to support setting the prototype at construction, shorthand for foo: foo assignments, defining methods, making super calls, and computing property names with expressions. when combined they bring object literals and class declarations closer together, and benefits object-based design from some of the same conveniences.

MODULES

In ES6 modules provide a course to load and manage dependencies through the new import export keywords. even after having good solutions like 3rd party libraries in es5, modularity remains an important concept for large applications. the following goals of this version make it an indispensable language feature:

1. Anticipate and prevent need of globals
2. Easy reallocation from global code to modular code
3. Smooth interoperability with existing js module systems like amd, commonjs, and

   node.js
4. Quick collation
5. Standardized protocol for sharing libraries

6. Compatibility with browser and non-browser environments
7. Easy asynchronous external loading

BLOCK SCOPING

Scoping becomes an ambiguous affair for developers who has background of c/c#/java. hoisting can add to that confusion. es5 lacked a very essential feature of block scoping, which deranked it in comparison to es6. though need became the mother of invention and block scoping came into the scenario. ES6 emerged out with this feature, block scoping can be achieved through using let keyword.

PROMISES

The ES6 is a promising language, where there is an asynchronous operation, there are promises to handle its results and errors. though callbacks are also designed for the same, but promises provide improved readability via method chaining and succinct error handling. many javascript libraries using promises, rsvp.js, q.js, and the $q in angularjs service are a few of many examples.

The above features of es6 are potent enough to make us pursue it. But let us evaluate the real scope of this technology before plunging into it.

SCOPE

The expanse of es6 right now is limited to the newest browsers, but soon it is going to expand its stretch as it presents a host of elegant solutions and syntax that many developers find appealing and useful. and if developers want to ensure of es6 code in older browsers a compiler named babel can transform es6 code into es5 code as part of a build step. once when all the browsers start implementing the specification, this build step can be removed.

Ember.js 2.0 is going to fully embrace es6 modules, and angular 2.0 has literally being written in a superset of es6 called atscript. eventually, plenty of the libraries that have been using older specification of javascript to build applications are all going to be written in es6 in the near future.

And if you are aloof from this incarnation, you would have to pay for the loss as the examples and documentation are going to start to revolve around es6. this confidence about es6 is not a fling, but a well thought/ required change that would help to meet the demands of ever larger and more complex applications written in javascript.

TECHNICAL REQUIREMENTS

The following are the technical requirements for the project:

- JAVA-SCRIPT AND ES6
- REACT-JS
- REDUX
- SQL SERVER 2017
- VISUAL STUDIO CODE (IDE)
- NODE-JS
- BOOTSTRAP
- CSS

FUTURE SCOPE OF THE PROJECT

There is a lot of scope for the future development of this project. In order to improve the application, some of the functionalities that can be added are as follows:

- Single Sign-On (SSO) using Active Directory (AD)
- Adding more admin roles to define privileges
- Extra Functionalities for Admin such as adding new fields to the registration form etc.
- Exam Report Generation
- Admin Email Notifications for candidates and admins as well
- Exam Portal appearing as several sections based on the skills chosen by the candidate
- Adding more information to the summary page like section wise marks etc.

REFERENCES

We have received immense help from these sources:

- https://developer.mozilla.org/en-US/docs/Web/JavaScript
- https://developer.mozilla.org/en-US/docs/Web/JavaScript/New_in_JavaScript/ECMAScript_2015_support_in_Mozilla
- https://www.tutorialspoint.com/nodejs/
- https://www.tutorialspoint.com/expressjs/

CONCLUSION

Front-end ecosystem is constantly evolving and changing on a day-to-day basis. some tools become “bestsellers” in terms of web app development, revolutionizing the workflow, while others become a dead end.

REACTJS can be easily labeled as a bestseller. launched back in 2013, this JavaScript library has quickly won popular affections. today it is maintained by Facebook, together with the developer community. it is used by the leading companies, like apple, PayPal, Netflix, while over 32 thousand of websites are built using react js framework.

Its advantages can be listed as:

- It facilitates the overall process of writing components
- It boosts productivity and facilitates further maintenance
- It ensures faster rendering
- It is SEO friendly

Benefits of using redux:

- Redux makes the state predictable.
- Maintainability.
- Debuggable for days.
- Ease of testing

So as we see react-redux applications are very much in demand and we are privileged to get a chance to learn and work on them and would definitely try our best to design it such that it proves to be beneficial to the organization.

And lastly we would thank everyone who helped us out during this whole tenure of 3 months.