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DATE:

COMPLETED THE PROJECT NAMED AS:IBM-NJ-ONLINEQUIZ

APPLICATION PHASE - TECHNOLOGY PROJECT NAME: NODE JS

SUBMITTEDBY,

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Phase 4-Enhancements Development (Deadline-weekG)

AdditionalFeatures:

CoreFunctionalFeatures

1. **UserAuthenticationandRoleManagement**
   a. Secureloginsystemwithroles:Admin,Instructor,Candidate.
   b. SingleSign-On(SSO)usingIBMCloudIdentityorLDAP.
2. **QuestionBankManagement**
   a. Supportformultiplequestiontypes:MCQ,true/false,shortanswer, coding, etc.
   b. Tagsandcategoriesfor easyfiltering.

AdvancedFeatures

1. **AI-PoweredInsightsandAnalytics**
   a. Performancetrends,skillgapanalysis,andtopic-wisebreakdown.
   b. Predictiveanalyticstosuggesttrainingmaterialorfuturelearning paths.
2. **AdaptiveTesting**
   a. Dynamicadjustmentofquestiondifficultybasedonreal-time performance.

Security&Compliance

1. **Data Encryption**
   a. End-to-endencryption of userdataand quizcontent.
2. **AuditLogging**
   a. Trackall useractionsfor complianceandtroubleshooting.

UI&UXImprovement:

UI(UserInterface)ImprovementPoints Modern,

Clean Design

- UseIBM’s **CarbonDesignSystem**forconsistencywithIBM branding.
- Consistent spacing,alignment,andtypography.

ColorScheme andContrast

- Usehigh-contrastcolorsforreadability(especiallyfor accessibility).
- Avoidusingred/greencombinations(colorblindnessconsideration).

UX (UserExperience)Improvement Points

1. **Onboarding /Instructions**

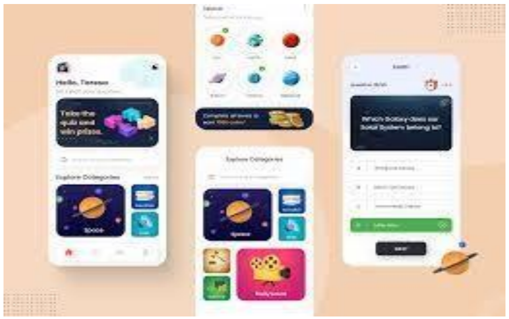
   a. Provideaquick,optional tutorial ortipsbeforethequizstarts.
   b. Clear,jargon-free instructions onhowto takethe quiz.

2. **FeedbackandScoring**

   a. Instantordelayedfeedback(dependingonsettings)aftersubmission.
   b. Showcorrect/incorrectanswerswithexplanations(ifenabled).

Post-Quiz Experience

a. Showsummary:number ofquestionsanswered,flagged,etc.
b. (Ifapplicable)Showresults,feedback,ornext steps


Hello, Teresa
Take the quiz and win prizes.
Explore Categories
Space
Explore Categories
Which Galaxy does our Solar System belong to?
Bollywood

APIEnhancements :

1. Authentication&Authorization

- Implement**OAuth 2.0/JWT**forsecureaccess.
- Role-basedaccesscontrol(Admin,Instructor,Student).
- APIkey supportfor 3rd-party integrations.

2. APIPerformanceOptimization

- Enable**pagination** forlargequiz/questionbanks.
- Use**caching** (e.g.,Redis)forfrequentlyaccesseddatalikequiztemplates.
- Optimizedatabasequeries(e.g.,indexes,batch processing).

3. Quiz ManagementEnhancements

- Supportfor**quiztemplates** (reusableformats).
- CRUDoperationsfor**questions,quizzes,andcategories**.
- Timersupportwith **start/stop/pausequiz**endpoints.
- **Randomquestiongeneration**basedondifficulty,tags,etc.

4. Quiz ManagementEnhancements

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6. Real-time Features

- WebSocketorlongpollingfor:
  - Livequiz updates.
  - Real-timeleaderboard.

7. ReportingsAnalytics

- APIendpointsfor:
  - Individualandaggregatescores.
  - Timespentperquestion.
  - Questiondifficultyanalysis.

PerformancesSecurityChecks:

PerformanceChecks

1. LoadTesting

- Simulatemultipleusersaccessingthequizconcurrently.
- Monitorresponsetime,throughput,andserverCPU/memoryusage.
- Tools:JMeter,Locust,LoadRunner.

2. StressTesting

- Pushthesystembeyonditsexpectedload.
- Identifybreakingpoints(maxconcurrentusers,maxquizzesrunning).

3.ScalabilityTesting

- Checkhowtheapplicationhandlesincreaseddata(e.g.,morequestions,users).

SecurityChecks

1. AuthenticationsAuthorization

- Ensureonlyregistereduserscanaccessquizzes.
- Implementrole-basedaccesscontrols(adminvs.participant).

2.DataEncryption

- UseHTTPSforallcommunication.
- Encryptsensitiveuserdataatrestandintransit.

TestingofEnhancements:

.UnderstandtheEnhancementDetails

- ***Whatis beingenhanced?***
  - New feature?
  - UIimprovement?

Scopeofimpact: Identifyaffectedmodules(e.g.,questiondisplay,timer, scoring).

Functional Testing

- **Newquizformats/types** (ifadded)
- **Questionnavigation**(next,previous,review)
- **Timerfunctionalities**

Regression Testing

- Testpreviouslyworkingfeatures:
  - Quizstart/end
  - Answerselection&saving
  - Scorecalculation

IntegrationTesting

- Iftheenhancementinvolvesbackendcommunication:
  - CheckAPIsinvolved(e.g.,fetchingquestions,submittinganswers).
  - Validateerrorhandlingforserverfailuresortimeouts.

Deployment(Netlify,VercelorCloudPlatform):

1. Netlify

Bestfor:Staticsites,JAMstack,frontend-heavyapps(React,Vue,HTML/CSS/JS)

Important Points:

- **Freetier**withcustomdomainandHTTPS.
- Built-in**CI/CD**:deploybypushingtoGitHub/GitLab/Bitbucket.
- Supports**serverlessfunctions**forbackendlogic(Node.js).

2. Vercel

Bestfor:Frontendframeworks(Next.js,React),SSR,edgefunctions

Important Points:

- Optimizedfor**Next.js**(supportsSSR,ISR,APIroutes).
- Freetierwithgenerouslimits.

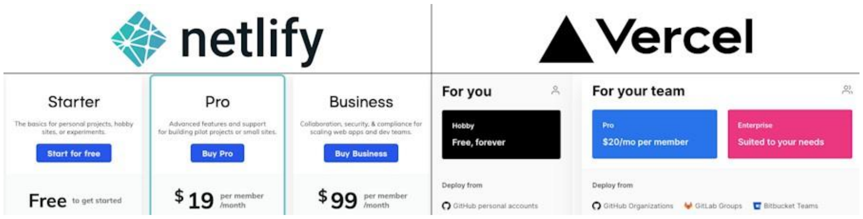
Git-baseddeployment

CloudPlatforms(AWS,Azure,GCP,IBMCloud)

Bestfor:Full-stackapps,complexinfrastructure,backendservices, databases

Important Points:

- Full controloverbackend,frontend,databases, authentication.
- SupportsDocker,Kubernetes,RESTAPIs,real-timedatabases.



Starter

The basics for personal projects, hobby sites, or experiments.

Free to get started

Pro

Advanced features and support for building pilot projects or small sites.

$ 19 per member /month

Business

Collaboration, security, & compliance for scaling web apps and dev teams.

$ 99 per member /month

For you

Hobby

Free, forever

Deploy from

GitHub personal accounts

For your team

Pro

$20/mo per member

Enterprise

Suited to your needs

Deploy from

GitHub Organizations GitLab Groups Bitbucket Teams