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Course Title : Software Engineering and ISD Laboratory

Project name : Bus ticket booking management system

Experiment no: 10

Experiment name: Application of Integration Testing, Path Testing with Cyclomatic Complexity Determination and Regression Testing to the Refined Program Code

Submitted To

Dr. Mohammad Zahidur Rahman
Professor
Dr. Md. Humayun Kabir
Professor
Department of Computer Science & Engineering
Jahangirnagar University, Savar.

Group No : 02

Group members :

Sl	Class Roll	Name
01	342	Tama Shil
02	370	Prokash Maitra
03	374	Mubasher adnan jihad
04	375	Pritam Saha

Tama Shil
ID - 342
Exam Roll - 191324

Integration testing, Path testing with cyclomatic complexity Determination and Regression testing are essential software techniques used to ensure the reliability, correctness and robustness of a software system like online bus ticket management system.

Lets explore how these techniques can be applied to the refined program code of such a system:

1) Integration Testing

Integration testing focuses on verifying that different components or modules of a system work together as expected when integrated. In the context of online bus ticket management system, this involves testing various modules like

users information, ticket booking, payment, and database interactions.

Application:

Integration testing involves verifying the interactions between different modules, components, and external systems in the system.

For bus ticket management system-

① User authentication Integration:

Test case secnarios where users registration, log in and log out.

Ensure that user credentials are validated correctly, and user sessions are managed properly.

② Ticket Book Integration:

The test process of searching for available buses, selecting seats, and confirming bookings.

Verify that the booking module communicates with inventory system and

updates seat availability accurately.

(iii) Payment Processing Integration;

Test Payment gateway integration, including various payment methods like credit cards, online wallets and net banking. Ensure successful trasactions and proper errror handling.

(iv) Database Integration:

Verify that data is correctly stored and retrevied from database.

Test case seenarios involving
- data consistency
- data update
- data retrieval

(v) Third party integration:

If the system uses external APIs for services like GPS tracking, test integration points to ensure data accuracy and system stability.

Name: Prokash Maitra

Roll : 370

Exam Roll: 191372

Experiment Name: Application Of Integration Testing, Path Testing with Cyclomatic Complexity determination and Regression Testing to the Refined Program Code of Bus Ticket Management System

Part : Path Testing with Cyclomatic Complexity Determination

Path Testing with Cyclomatic Complexity Determination:

Cyclomatic complexity is a metric used to determine the complexity of a program's control flow. Path testing involves testing various execution paths through the code to ensure all possible scenarios are covered.

Applications:

Cyclomatic Complexity helps identify the no. of independent paths through the code.

For online Bus Ticket Management System:

(i) Calculate Cyclomatic Complexity:

Use a tool or manual analysis to calculate the cyclomatic complexity of the codebase. Identify functions or methods with high complexity.

(ii) Identify Key Path:

Identify critical paths in a system, such as the path from user login to ticket booking and payment.

(iii) Create Test case:

Generate test case to uncover errors and to cover each identified path. It involves writing test cases for different user roles, input validation and handling exception scenarios.

(iv) Execute Test Case:

Execute Test case systematically, ensuring that each path is tested thoroughly. Track code coverage metrics to monitor the coverage archived.

Regression Testing:

Regression testing is crucial to ensure that new changes or enhancement do not introduce defects into existing functionalities. Whenever there are code updates, bug fixes, or new feature added to the Online bug ticket managing system, regression Testing must be performed.

Mubasheer Adnan Jihad
Roll : 374

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- Application of regression testing:

Regression testing ensures that new code changes do not introduce new defects or break existing functionality.

I. Maintain a test suite: Maintain a comprehensive suite of test cases that covers all aspects of the system. This suite includes unit tests, integration tests, and functional tests.

II. Automate Regression tests: Automate as many regression test cases as possible to expedite testing when code changes occur. Continuous integration and continuous deployment (CI/CD) pipelines can help automate this process.

III. Version Control: Use version control systems to track code changes. Whenever there's a code update, run the regression test suite against the new version of the code to ensure everything still works as expected.

IV. Bug Tracking: If regression tests reveal new defects, log these issues in a bug tracking system and prioritize their resolution.

Additional testing considerations

4. Automated Testing:

Consider automating the execution of test cases, especially for regression testing and integration testing. Automated testing can save time and effort in running test cases repeatedly, especially when updates are made to the codebase.

Name: Pritam Saha
ID: 375

5. Boundary Value Testing: In addition to the mentioned testing techniques, perform boundary value testing to ensure the system handles extreme and edge cases effectively. For example, test the system with minimum and maximum ticket quantities, invalid user inputs and situations where the system may encounter unexpected data.

6. Performance testing: While not directly mentioned it is important to include performance testing in the overall testing strategy. Evaluate how the system performs under expected and peak loads ensuring that it can handle a high volume of users booking tickets simultaneously.

7. Security Testing: Conduct security testing to identify vulnerabilities and protected sensitive user data. Test for common

security issues such as SQL injection, cross site scripting (XSS) and data breaches.

8. Usability Testing: Lastly, usability testing can help insure that the online bus ticket management system is user friendly and intuitive. Evaluate the user interface, user experience and accesibility to ensure that customers can easily navigate and use the system.

Incorporating this testing techniques into the development and maintenance of the online bus ticket management system will help ensure to its robustness, correctness, and reliability. Ultimately leading to a better user experience and fewer post production issues.