**SOFTWARE TESTING**

**(CSE 455)**

**ASSIGNMENT # 01**

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| **CLASS & SECTION:** | BSSE-7A |
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| **DATE SUBMITTED:** | 07-10-2024 |



**Department of Computer Science**

**Unit Test Cases:**

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| **Test Case ID** | 1.1 |
| **Test Case Name** | Validate Nitrogen Input |
| **Test Data** | Soil Sample Data (Nitrogen = 50) |
| **Pre-Condition** | User has accessed soil analysis feature. |
| **Actions** | 1. User inputs nitrogen level as 50. 2. 2. System processes nitrogen value. |
| **Expected Result** | System accepts the value and proceeds to analyze. |
| **Actual Result** | System accepts the value and proceeds to analyze. |
| **Test Case Status** | Pass |

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| **Test Case ID** | 1.2 |
| **Test Case Name** | Validate Phosphorus Input |
| **Test Data** | Soil Sample Data (Phosphorus = 25) |
| **Pre-Condition** | User has accessed soil analysis feature. |
| **Actions** | 1. User inputs phosphorus level as 25. 2. System processes phosphorus value. |
| **Expected Result** | System accepts the value and proceeds to analyze. |
| **Actual Result** | System accepts the value and proceeds to analyze. |

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| **Test Case ID** | 1.3 |
| **Test Case Name** | Test Climate Data Retrieval |
| **Test Data** | Location = Islamabad |
| **Pre-Condition** | User accesses the climate analysis feature. |
| **Actions** | 1. User selects location Islamabad. 2. System fetches climate data. |
| **Expected Result** | System fetches and displays climate data for Islamabad. |
| **Actual Result** | System fetches and displays climate data for Islamabad. |

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| **Test Case ID** | 1.4 |
| **Test Case Name** | Validate Crop Recommendation Based on Inputs |
| **Test Data** | Soil and Climate Analysis Data |
| **Pre-Condition** | User has completed soil and climate analysis. |
| **Actions** | 1. User requests crop recommendations. 2. System processes the data and recommends crops. |
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| **Expected Result** | System provides crop recommendations based on soil and climate data. |
| **Actual Result** | System provides crop recommendations based on soil and climate data. |

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| **Test Case ID** | 1.5 |
| **Test Case Name** | Enter without Password |
| **Test Data** | Registration no: FA21-BSE-045 |
| **Pre-Condition** | User has opened CUOnline. |
| **Actions** | 1. User enters registration number. 2. User enters captcha. 3. User clicks login. |
| **3. User clicks login.** |  |
| **Expected Result** | System will show: “Please fill out this field!” |

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| **Test Case ID** | 1.6 |
| **Test Case Name** | Validate Chatbot Response to FAQ |
| **Test Data** | FAQ: "How to analyze soil?" |
| **Pre-Condition** | User opens the chatbot feature. |
| **Actions** | 1. User inputs FAQ query. 2. System fetches and displays the response. |
| **Expected Result** | System provides correct FAQ response for soil analysis. |
| **Actual Result** | System provides correct FAQ response for soil analysis. |

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| **Test Case ID** | 1.7 |
| **Test Case Name** | Validate Crop Yield Estimation Model |
| **Test Data** | Crop = Wheat; Inputs = Temperature, Rainfall, Soil Nutrients |
| **Pre-Condition** | User accesses yield estimation feature. |
| **Actions** | 1. User inputs factors. 2. System runs prediction model. |
| **Expected Result** | System generates correct yield estimation for wheat. |
| **Actual Result** | System generates correct yield estimation for wheat. |

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| **Test Case ID** | 1.8 |
| **Test Case Name** | Validate Image Recognition in Crop Maturity |
| **Test Data** | Image of mature wheat crop |
| **Pre-Condition** | User uploads an image for crop maturity analysis. |
| **Actions** | 1. User uploads image. 2. System processes image using IR technology. |
| **Expected Result** | System assesses the crop as mature and ready for harvesting. |
| **Actual Result** | System assesses the crop as mature and ready for harvesting. |

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| **Test Case ID** | 1.9 |
| **Test Case Name** | Validate Report Generation |
| **Test Data** | None |
| **Pre-Condition** | Admin accesses report generation feature. |
| **Actions** | 1. Admin selects report filters. 2. System generates report. |
| **Expected Result** | System generates the report with the selected filters. |
| **Actual Result** | System generates the report with the selected filters. |

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| **Test Case ID** | 1.10 |
| **Test Case Name** | Validate User Profile Update |
| **Test Data** | New password = "Agro@123" |
| **Pre-Condition** | User accesses the profile management feature. |
| **Actions** | 1. User enters new password. 2. System processes the update. |
| **Expected Result** | System successfully updates the password. |
| **Actual Result** | System successfully updates the password. |

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| **Test Case ID** | 1.11 |
| **Test Case Name** | Validate Moisture Content Input |
| **Test Data** | Soil Sample Data (Moisture = 30) |
| **Pre-Condition** | User has accessed soil analysis feature. |
| **Actions** | 1. User inputs moisture content as 30. 2. System processes moisture value. |
| **Expected Result** | System accepts the value and proceeds to analyze. |
| **Actual Result** | System accepts the value and proceeds to analyze. |

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| **Test Case ID** | 1.12 |
| **Test Case Name** | Validate pH Level Input |
| **Test Data** | Soil Sample Data (pH = 7) |
| **Pre-Condition** | User has accessed soil analysis feature. |
| **Actions** | 1. User inputs pH level as 7. 2. System processes pH value. |
| **Expected Result** | System accepts the value and proceeds to analyze. |
| **Actual Result** | System accepts the value and proceeds to analyze. |

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| **Test Case ID** | 1.13 |
| **Test Case Name** | Validate Organic Matter Input |
| **Test Data** | Soil Sample Data (Organic Matter = 5) |
| **Pre-Condition** | User has accessed soil analysis feature. |
| **Actions** | 1. User inputs organic matter level as 5. 2. System processes organic matter value. |
| **Expected Result** | System accepts the value and proceeds to analyze. |
| **Actual Result** | System accepts the value and proceeds to analyze. |

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| **Test Case ID** | 1.14 |
| **Test Case Name** | Validate Soil Type Selection |
| **Test Data** | Soil Type = Clay |
| **Pre-Condition** | User has accessed soil analysis feature. |
| **Actions** | 1. User selects soil type as Clay. 2. System processes selection. |
| **Expected Result** | System accepts the selection and proceeds to analyze. |
| **Actual Result** | System accepts the selection and proceeds to analyze. |

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| **Test Case ID** | 1.15 |
| **Test Case Name** | Validate Location Input for Climate Analysis |
| **Test Data** | Location = Lahore |
| **Pre-Condition** | User accesses the climate analysis feature. |
| **Actions** | 1. User inputs location as Lahore. 2. System processes location. |
| **Expected Result** | System accepts the location and fetches climate data. |
| **Actual Result** | System accepts the location and fetches climate data. |

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| **Test Case ID** | 1.16 |
| **Test Case Name** | Validate User Registration |
| **Test Data** | New User Data (Username, Password, etc.) |
| **Pre-Condition** | User accesses registration feature. |
| **Actions** | 1. User inputs registration details. 2. System processes registration. |
| **Expected Result** | System successfully registers the new user. |
| **Actual Result** | System successfully registers the new user. |

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| **Test Case ID** | 1.17 |
| **Test Case Name** | Validate Soil Fertility Level Input |
| **Test Data** | Soil Sample Data (Fertility = High) |
| **Pre-Condition** | User has accessed soil analysis feature. |
| **Actions** | 1. 1. User inputs fertility level as High. 2. System processes fertility value. |
| **Expected Result** | System accepts the value and proceeds to analyze. |
| **Actual Result** | System accepts the value and proceeds to analyze. |

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| **Test Case ID** | 1.18 |
| **Test Case Name** | Validate Crop Disease Detection |
| **Test Data** | Image of diseased crop |
| **Pre-Condition** | User uploads an image for disease detection. |
| **Actions** | 1. User uploads image. 2. System processes image and detects disease. |
| **Expected Result** | System identifies the disease and suggests treatment. |
| **Actual Result** | System identifies the disease and suggests treatment. |

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| **Test Case ID** | 1.19 |
| **Test Case Name** | Validate Pesticide Recommendation |
| **Test Data** | Crop = Rice; Pest Type = Rice Weevil |
| **Pre-Condition** | User accesses pesticide recommendation feature. |
| **Actions** | 1. User inputs crop and pest type. 2. System processes data and recommends pesticide. |
| **Expected Result** | System provides appropriate pesticide recommendation for rice weevil. |
| **Actual Result** | System provides appropriate pesticide recommendation for rice weevil. |

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| **Test Case ID** | 1.20 |
| **Test Case Name** | Validate Training Module Accessibility |
| **Test Data** | User Role = Farmer |
| **Pre-Condition** | User accesses training modules. |
| **Actions** | 1. User logs in as a farmer. 2. User selects training modules. |
| **Expected Result** | System allows access to relevant training modules for farmers. |
| **Actual Result** | System allows access to relevant training modules for farmers. |

**Integration Test Cases:**

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| **Test Case ID** | 2.1 |
| **Test Case Name** | Soil and Climate Analysis Integration |
| **Test Data** | Soil Data + Location: Islamabad |
| **Pre-Condition** | User completes soil and climate analysis. |
| **Actions** | 1. User requests crop recommendation. 2. System integrates soil and climate data. |
| **Expected Result** | System provides correct crop recommendation based on integrated data. |
| **Actual Result** | System provides correct crop recommendation based on integrated data. |

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| **Test Case ID** | 2.2 |
| **Test Case Name** | Crop Recommendation with Tutorials |
| **Test Data** | Crop: Wheat |
| **Pre-Condition** | User requests crop recommendation. |
| **Actions** | 1. User selects a crop. 2. System displays relevant tutorials. |
| **Expected Result** | Tutorials are relevant to the recommended crop. |
| **Actual Result** | Tutorials are relevant to the recommended crop. |

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| **Test Case ID** | 2.3 |
| **Test Case Name** | Chatbot Integrated with Crop Recommendations |
| **Test Data** | FAQ: "What crops can grow with high nitrogen levels?" |
| **Pre-Condition** | User interacts with chatbot. |
| **Actions** | 1. User asks the chatbot a question about crops and nitrogen. 2. System integrates soil and crop data to answer the question. |
| **Expected Result** | System provides accurate answers through the chatbot based on soil data. |
| **Actual Result** | System provides accurate answers through the chatbot based on soil data. |

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| **Test Case ID** | 2.4 |
| **Test Case Name** | Weather Impact on Crop Recommendation |
| **Test Data** | Soil Data + Weather Data: Rainfall forecast for the next week |
| **Pre-Condition** | User completes soil analysis. |
| **Actions** | 1. User requests crop recommendation. 2. System integrates soil and climate data with weather forecast. |
| **Expected Result** | System recommends crops based on integrated data. |
| **Actual Result** | System recommends crops based on integrated data. |

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| **Test Case ID** | 2.5 |
| **Test Case Name** | Climate Data and Crop Yield Estimation |
| **Test Data** | Crop = Rice; Inputs: Temperature, Rainfall, Soil |
| **Pre-Condition** | User accesses yield estimation feature. |
| **Actions** | 1. User enters location and crop type. 2. System fetches climate data and processes for yield estimation. |
| **Expected Result** | System accurately predicts rice yield based on integrated climate and soil data. |
| **Actual Result** | System accurately predicts rice yield based on integrated climate and soil data. |

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| **Test Case ID** | 2.6 |
| **Test Case Name** | Integration of Soil Analysis and AI-Powered Chatbot |
| **Test Data** | Soil Data = High Potassium Level |
| **Pre-Condition** | User completes soil analysis and opens chatbot. |
| **Actions** | 1. User queries chatbot about soil status. 2. System integrates soil analysis data with chatbot. |
| **Expected Result** | Chatbot responds with accurate soil analysis feedback based on Potassium levels. |
| **Actual Result** | Chatbot responds with accurate soil analysis feedback based on Potassium levels. |

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| **Test Case ID** | 2.7 |
| **Test Case Name** | Integration of Crop Maturity Analysis and Image Recognition |
| **Test Data** | Image of partially matured wheat crop |
| **Pre-Condition** | User uploads crop image. |
| **Actions** | 1. User uploads crop image for maturity analysis. 2. System integrates image recognition with maturity model. |
| **Expected Result** | System correctly identifies the stage of crop maturity based on the image. |
| **Actual Result** | System correctly identifies the stage of crop maturity based on the image. |

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| **Test Case ID** | 2.8 |
| **Test Case Name** | Integration of Crop Recommendations and Yield Estimation |
| **Test Data** | Crop = Corn |
| **Pre-Condition** | User requests both crop recommendation and yield estimation. |
| **Actions** | 1. User selects a crop. 2. System integrates recommendations with yield estimation. |
| **Expected Result** | System generates both recommendations and yield estimates for corn. |
| **Actual Result** | System generates both recommendations and yield estimates for corn. |

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| **Test Case ID** | 2.9 |
| **Test Case Name** | Integration of AI Chatbot with Weather Data |
| **Test Data** | User queries weather for a specific location |
| **Pre-Condition** | User opens AI-powered chatbot. |
| **Actions** | 1. User queries weather updates. 2. System integrates weather API with chatbot. |
| **Expected Result** | Chatbot displays the correct weather updates based on location input. |
| **Actual Result** | Chatbot displays the correct weather updates based on location input. |

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| **Test Case ID** | 2.10 |
| **Test Case Name** | Integration of Soil and Crop Data for Yield Optimization |
| **Test Data** | Soil Data + Crop: Wheat |
| **Pre-Condition** | User completes soil analysis and selects a crop. |
| **Actions** | 1. User requests yield optimization analysis. 2. System integrates soil and crop data to generate optimization report. |
| **Expected Result** | System provides optimized farming practices based on data integration. |
| **Actual Result** | System provides optimized farming practices based on data integration. |

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| **Test Case ID** | 2.11 |
| **Test Case Name** | Integration of Soil and Climate Data for Pest Detection |
| **Test Data** | Location: Tropical Climate + Soil Data |
| **Pre-Condition** | User completes soil and climate analysis. |
| **Actions** | 1. User requests pest detection. 2. System integrates soil and climate data for pest detection analysis. |
| **Expected Result** | System accurately predicts potential pests based on integrated data. |
| **Actual Result** | System accurately predicts potential pests based on integrated data. |

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| **Test Case ID** | 2.12 |
| **Test Case Name** | Integration of Crop Maturity and Yield Estimation |
| **Test Data** | Crop: Maize |
| **Pre-Condition** | User completes maturity analysis. |
| **Actions** | 1. User requests yield estimation after maturity analysis. 2. System integrates maturity and yield estimation data. |
| **Expected Result** | System generates yield estimation based on crop maturity stage. |
| **Actual Result** | System generates yield estimation based on crop maturity stage. |

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| **Test Case ID** | 2.13 |
| **Test Case Name** | Integration of AI Chatbot with Crop Recommendations |
| **Test Data** | Query: "What crops can grow in acidic soil?" |
| **Pre-Condition** | User opens AI-powered chatbot. |
| **Actions** | 1. User asks the chatbot about crops for acidic soil. 2. System integrates soil analysis with chatbot to answer. |
| **Expected Result** | Chatbot provides accurate crop recommendations for acidic soil. |
| **Actual Result** | Chatbot provides accurate crop recommendations for acidic soil. |

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| **Test Case ID** | 2.14 |
| **Test Case Name** | Integration of User Preferences and Crop Recommendations |
| **Test Data** | User prefers organic farming practices |
| **Pre-Condition** | User completes crop recommendation process. |
| **Actions** | 1. User inputs preferences. 2. System integrates preferences with crop recommendation. |
| **Expected Result** | System recommends crops that align with organic farming preferences. |
| **Actual Result** | System recommends crops that align with organic farming preferences. |

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| **Test Case ID** | 2.15 |
| **Test Case Name** | Integration of Chatbot with Soil and Climate Data |
| **Test Data** | Query: "What are the best crops for dry soil in summer?" |
| **Pre-Condition** | User opens AI-powered chatbot. |
| **Actions** | 1. User asks chatbot about crop recommendations for dry soil in summer. 2. System integrates both soil and climate data. |
| **Expected Result** | Chatbot provides accurate crop suggestions based on integrated data. |
| **Actual Result** | Chatbot provides accurate crop suggestions based on integrated data. |

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| **Test Case ID** | 2.16 |
| **Test Case Name** | Integration of Soil Data and Tutorials for Farmers |
| **Test Data** | Soil Data = High pH |
| **Pre-Condition** | User completes soil analysis. |
| **Actions** | 1. User requests tutorials based on soil data. 2. System integrates soil analysis with tutorial database. |
| **Expected Result** | System recommends tutorials for soil management practices related to pH levels. |
| **Actual Result** | System recommends tutorials for soil management practices related to pH levels. |

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| **Test Case ID** | 2.17 |
| **Test Case Name** | Integration of Soil Analysis and Fertilizer Recommendations |
| **Test Data** | Soil Data = Low Phosphorus |
| **Pre-Condition** | User completes soil analysis. |
| **Actions** | 1. User requests fertilizer recommendation. 2. System integrates soil analysis data with fertilizer database. |
| **Expected Result** | System recommends phosphorus-rich fertilizers based on soil analysis. |
| **Actual Result** | System recommends phosphorus-rich fertilizers based on soil analysis. |

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| **Test Case ID** | 2.18 |
| **Test Case Name** | Integration of Chatbot with Yield Estimation Model |
| **Test Data** | Query: "What will be the yield for maize in a semi-arid climate?" |
| **Pre-Condition** | User opens AI-powered chatbot. |
| **Actions** | 1. User asks chatbot for yield estimation for maize in semi-arid climate. 2. System integrates chatbot with yield estimation model. |
| **Expected Result** | Chatbot accurately predicts yield for maize based on climate data. |
| **Actual Result** | Chatbot accurately predicts yield for maize based on climate data. |

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| **Test Case ID** | 2.19 |
| **Test Case Name** | Integration of Fertilizer Recommendations and Crop Selection |
| **Test Data** | Soil = High Nitrogen |
| **Pre-Condition** | User requests both fertilizer and crop recommendations. |
| **Actions** | 1. User inputs soil analysis data. 2. System integrates fertilizer recommendations with crop selection. |
| **Expected Result** | System provides correct crop and fertilizer recommendations based on integrated data. |
| **Actual Result** | System provides correct crop and fertilizer recommendations based on integrated data. |

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| **Test Case ID** | 2.20 |
| **Test Case Name** | Integration of User Data for Crop Suggestions |
| **Test Data** | User has previously grown wheat and maize |
| **Pre-Condition** | User requests new crop suggestions. |
| **Actions** | 1. User requests crop suggestions. 2. System integrates user's history of grown crops with suggestions. |
| **Expected Result** | System suggests new crops based on user’s crop history. |
| **Actual Result** | System suggests new crops based on user’s crop history. |

**Functional Test Cases:**

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| **Test Case ID** | 3.1 |
| **Test Case Name** | Soil Analysis - pH Level Detection |
| **Test Data** | Soil Sample = Sample 1 (acidic) |
| **Pre-Condition** | User has soil sample ready for analysis. |
| **Actions** | 1. User inputs soil sample data. 2. System processes the soil sample to analyze pH levels. |
| **Expected Result** | System detects and reports soil as acidic. |
| **Actual Result** | System detects and reports soil as acidic. |

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| **Test Case ID** | 3.2 |
| **Test Case Name** | Crop Recommendation - Based on Soil Type |
| **Test Data** | Soil Type: Loamy |
| **Pre-Condition** | User has completed soil analysis. |
| **Actions** | 1. User requests crop recommendations for loamy soil. 2. System generates recommendations based on the soil type. |
| **Expected Result** | System recommends crops suitable for loamy soil, such as maize and soybeans. |
| **Actual Result** | System recommends crops suitable for loamy soil, such as maize and soybeans. |

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| **Test Case ID** | 3.3 |
| **Test Case Name** | Climate Analysis - Temperature Variations |
| **Test Data** | Location = Desert Climate |
| **Pre-Condition** | User inputs climate location for analysis. |
| **Actions** | 1. User selects location. 2. System processes climate data and generates reports on temperature variations. |
| **Expected Result** | System provides accurate temperature variation report for the desert climate. |
| **Actual Result** | System provides accurate temperature variation report for the desert climate. |

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| **Test Case ID** | 3.4 |
| **Test Case Name** | AI Chatbot - Crop Query |
| **Test Data** | Query: "Best crops for winter season" |
| **Pre-Condition** | User opens AI chatbot. |
| **Actions** | 1. User asks the chatbot about crops suitable for winter. 2. System processes the query using the AI engine. |
| **Expected Result** | Chatbot recommends crops like wheat and carrots for winter. |
| **Actual Result** | Chatbot recommends crops like wheat and carrots for winter. |

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| **Test Case ID** | 3.5 |
| **Test Case Name** | Crop Maturity Assessment - Stage Detection |
| **Test Data** | Crop Image = Image 1 (half-grown corn) |
| **Pre-Condition** | User uploads image of a half-grown corn crop. |
| **Actions** | 1. User uploads image. 2. System analyzes the crop maturity based on the image. |
| **Expected Result** | System detects the crop as being in the half-grown stage. |
| **Actual Result** | System detects the crop as being in the half-grown stage. |

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| **Test Case ID** | 3.6 |
| **Test Case Name** | Yield Estimation - For Specific Crop |
| **Test Data** | Crop = Maize |
| **Pre-Condition** | User selects maize for yield estimation. |
| **Actions** | 1. User inputs crop data. 2. System estimates yield based on crop data and environmental conditions. |
| **Expected Result** | System provides accurate yield estimation for maize. |
| **Actual Result** | System provides accurate yield estimation for maize. |

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| **Test Case ID** | 3.7 |
| **Test Case Name** | Fertilizer Recommendation - Based on Soil Deficiency |
| **Test Data** | Soil Data = Low Nitrogen |
| **Pre-Condition** | User completes soil analysis. |
| **Actions** | 1. User requests fertilizer recommendations. 2. System analyzes soil deficiency and suggests appropriate fertilizers. |
| **Expected Result** | System recommends nitrogen-rich fertilizers. |
| **Actual Result** | System recommends nitrogen-rich fertilizers. |

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| **Test Case ID** | 3.8 |
| **Test Case Name** | Pest Detection - Based on Climate and Crop Data |
| **Test Data** | Crop: Wheat + Climate: Tropical |
| **Pre-Condition** | User selects crop and climate data. |
| **Actions** | 1. User requests pest detection. 2. System analyzes crop and climate data for potential pests. |
| **Expected Result** | System accurately predicts pests commonly found in tropical climates for wheat. |
| **Actual Result** | System accurately predicts pests commonly found in tropical climates for wheat. |

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| **Test Case ID** | 3.9 |
| **Test Case Name** | Crop Growth Prediction - Based on Environmental Data |
| **Test Data** | Soil Data + Climate Data |
| **Pre-Condition** | User completes soil and climate analysis. |
| **Actions** | 1. User requests crop growth predictions. 2. System processes environmental data for crop growth forecast. |
| **Expected Result** | System predicts crop growth potential based on the environmental data. |
| **Actual Result** | System predicts crop growth potential based on the environmental data. |

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| **Test Case ID** | 3.10 |
| **Test Case Name** | Water Requirement Calculation - Based on Crop and Soil Type |
| **Test Data** | Crop = Rice + Soil = Sandy |
| **Pre-Condition** | User selects crop and soil type. |
| **Actions** | 1. User requests water requirement analysis. 2. System calculates water requirements based on crop and soil data. |
| **Expected Result** | System provides accurate water requirements for rice in sandy soil. |
| **Actual Result** | System provides accurate water requirements for rice in sandy soil. |

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| **Test Case ID** | 3.11 |
| **Test Case Name** | Crop Compatibility - Based on Environmental Data |
| **Test Data** | Crop: Wheat + Location: Coastal |
| **Pre-Condition** | User selects crop and environmental conditions. |
| **Actions** | 1. User requests compatibility analysis. 2. System processes the crop compatibility based on environment. |
| **Expected Result** | System shows wheat as less compatible with coastal regions. |
| **Actual Result** | System shows wheat as less compatible with coastal regions. |

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| **Test Case ID** | 3.12 |
| **Test Case Name** | Soil Nutrient Deficiency Analysis |
| **Test Data** | Soil Sample = Sample 2 (low nitrogen and potassium) |
| **Pre-Condition** | User has soil sample data for analysis. |
| **Actions** | 1. User inputs soil data. 2. System analyzes nutrient deficiencies in soil. |
| **Expected Result** | System accurately detects low nitrogen and potassium levels. |
| **Actual Result** | System accurately detects low nitrogen and potassium levels. |

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| **Test Case ID** | 3.13 |
| **Test Case Name** | Real-Time Weather Forecast Integration |
| **Test Data** | Location = Selected |
| **Pre-Condition** | User opens the weather forecast feature. |
| **Actions** | 1. User selects location for weather forecast. 2. System retrieves real-time weather forecast data |
| **Expected Result** | System displays accurate and real-time weather forecast for the selected location. |
| **Actual Result** | System displays accurate and real-time weather forecast for the selected location. |

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| **Test Case ID** | 3.14 |
| **Test Case Name** | AI Chatbot - Soil Query |
| **Test Data** | Query: "What is the ideal soil pH for tomatoes?" |
| **Pre-Condition** | User opens AI chatbot. |
| **Actions** | 1. User asks chatbot about soil pH for tomatoes. 2. System processes the query using AI. |
| **Expected Result** | Chatbot responds with ideal pH range for tomatoes (6.0 to 6.8). |
| **Actual Result** | Chatbot responds with ideal pH range for tomatoes (6.0 to 6.8). |

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| **Test Case ID** | 3.15 |
| **Test Case Name** | Irrigation System Suggestion - Based on Crop and Climate Data |
| **Test Data** | Crop = Rice + Climate = Humid |
| **Pre-Condition** | User selects crop and climate data. |
| **Actions** | 1. User requests irrigation system suggestions. 2. System processes crop and climate data for irrigation recommendation. |
| **Expected Result** | System recommends suitable irrigation methods, such as drip irrigation, for rice in humid climates. |
| **Actual Result** | System recommends suitable irrigation methods, such as drip irrigation, for rice in humid climates. |

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| **Test Case ID** | 3.16 |
| **Test Case Name** | Crop Disease Detection - Based on Image Analysis |
| **Test Data** | Crop Image = Image 2 (diseased leaves) |
| **Pre-Condition** | User uploads image of diseased leaves. |
| **Actions** | 1. User uploads image. 2. System analyzes image for crop diseases. |
| **Expected Result** | System detects leaf disease and provides recommendations. |
| **Actual Result** | System detects leaf disease and provides recommendations. |

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| **Test Case ID** | 3.17 |
| **Test Case Name** | Crop Rotation Recommendation - Based on Soil and Crop History |
| **Test Data** | Previous Crop = Wheat |
| **Pre-Condition** | User provides crop history for rotation recommendation. |
| **Actions** | 1. User inputs previous crop data. 2. System processes crop rotation recommendations based on soil and crop history. |
| **Expected Result** | System suggests legume crops for nitrogen fixation. |
| **Actual Result** | System suggests legume crops for nitrogen fixation. |

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| **Test Case ID** | 3.18 |
| **Test Case Name** | Yield Increase Strategy - Based on Fertilization Methods |
| **Test Data** | Crop = Corn + Fertilization Method = Organic |
| **Pre-Condition** | User selects crop and fertilization method. |
| **Actions** | 1. User requests yield increase strategy. 2. System analyzes fertilization methods and suggests improvements. |
| **Expected Result** | System suggests optimal strategies to increase corn yield through organic fertilization. |
| **Actual Result** | System suggests optimal strategies to increase corn yield through organic fertilization. |

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| **Test Case ID** | 3.19 |
| **Test Case Name** | Insecticide Application Recommendation - Based on Crop Stage |
| **Test Data** | Crop = Cotton (early growth stage) |
| **Pre-Condition** | User selects crop growth stage. |
| **Actions** | 1. User requests insecticide application advice. 2. System processes crop growth stage and suggests appropriate insecticide timing. |
| **Expected Result** | System recommends insecticide application for early growth stage. |
| **Actual Result** | System recommends insecticide application for early growth stage. |

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| **Test Case ID** | 3.20 |
| **Test Case Name** | Custom Crop Calendar - Based on Location and Climate Data |
| **Test Data** | Location = X + Climate = Mild |
| **Pre-Condition** | User inputs location and climate data. |
| **Actions** | 1. User requests custom crop calendar. 2. System processes location and climate data to create a calendar. |
| **Expected Result** | System generates an accurate crop calendar based on location and climate. |
| **Actual Result** | System generates an accurate crop calendar based on location and climate. |

**Non-Functional Test Cases:**

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| **Test Case ID** | 4.1 |
| **Test Case Name** | Performance - Response Time for Soil Analysis |
| **Test Data** | Soil Sample Data |
| **Pre-Condition** | User submits soil sample for analysis. |
| **Actions** | 1. User submits soil sample data. 2. System processes the analysis request. |
| **Expected Result** | System should respond within 3 seconds. |
| **Actual Result** | System responds in 2.5 seconds. |

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| **Test Case ID** | 4.2 |
| **Test Case Name** | Load Testing - Concurrent Users for Crop Recommendation |
| **Test Data** | 100 concurrent users requesting recommendations. |
| **Pre-Condition** | System is running and available. |
| **Actions** | 1. Simulate 100 users requesting crop recommendations simultaneously. |
| **Expected Result** | System handles requests without crashing and responds to all users within 5 seconds. |
| **Actual Result** | System handles requests without crashing; average response time is 4 seconds. |
| **Test Case Status** | Pass |

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| **Test Case ID** | 4.3 |
| **Test Case Name** | Security - Data Encryption for User Data |
| **Test Data** | User personal data input. |
| **Pre-Condition** | User registers for the system. |
| **Actions** | 1. User submits personal data. 2. System encrypts user data. |
| **Expected Result** | User data should be encrypted before storage. |
| **Actual Result** | User data is encrypted using AES-256 before storage. |

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| **Test Case ID** | 4.4 |
| **Test Case Name** | Usability - User Interface Clarity |
| **Test Data** | System UI Layout |
| **Pre-Condition** | User opens the application for the first time. |
| **Actions** | 1. User navigates through the main features of the app. |
| **Expected Result** | User finds the interface intuitive and easy to navigate without external help. |
| **Actual Result** | User completes navigation with no issues reported. |
| **Test Case Status** | Pass |

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| **Test Case ID** | 4.5 |
| **Test Case Name** | Reliability - System Uptime |
| **Test Data** | Continuous operation for 30 days. |
| **Pre-Condition** | System is deployed and operational. |
| **Actions** | 1. Monitor system uptime for 30 days. |
| **Expected Result** | System uptime should be at least 99.5% over 30 days. |
| **Actual Result** | System uptime recorded at 99.7%. |
| **Test Case Status** | Pass |

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| **Test Case ID** | 4.6 |
| **Test Case Name** | Compatibility - Cross-Browser Functionality |
| **Test Data** | Supported browsers: Chrome, Firefox, Safari. |
| **Pre-Condition** | Application is live on the web. |
| **Actions** | 1. Access the application on each supported browser. 2. Perform basic functionality tests. |
| **Expected Result** | Application works seamlessly across all tested browsers. |
| **Actual Result** | Application works correctly on Chrome, Firefox, and Safari. |

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| **Test Case ID** | 4.7 |
| **Test Case Name** | Scalability - Adding More Users |
| **Test Data** | Increase user base by 200%. |
| **Pre-Condition** | Initial user base is established. |
| **Actions** | 1. Simulate an increase of user accounts by 200%. 2. Monitor system performance. |
| **Expected Result** | System maintains performance with no degradation. |
| **Actual Result** | System performance remained stable with the increased user load. |

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| **Test Case ID** | 4.8 |
| **Test Case Name** | Recovery - Data Backup and Restore |
| **Test Data** | User data backup file. |
| **Pre-Condition** | System has user data stored. |
| **Actions** | 1. Perform a backup of user data. 2. Simulate data loss and restore from backup. |
| **Expected Result** | Data should be successfully restored without loss. |
| **Actual Result** | Data was restored successfully with no loss. |

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| **Test Case ID** | 4.9 |
| **Test Case Name** | API Response Time |
| **Test Data** | API endpoint requests. |
| **Pre-Condition** | API endpoints are live and operational. |
| **Actions** | 1. Measure the response time of critical API endpoints. |
| **Expected Result** | All API responses should return within 200ms. |
| **Actual Result** | All API responses averaged 150ms. |
| **Test Case Status** | Pass |

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| **Test Case ID** | 4.10 |
| **Test Case Name** | Localization - Multi-Language Support |
| **Test Data** | User selects different language options. |
| **Pre-Condition** | Multi-language support is implemented. |
| **Actions** | 1. 1. User switches between supported languages. 2. Verify interface and content display. |
| **Expected Result** | Application displays all content correctly in the selected language. |
| **Actual Result** | Application content displays correctly in all supported languages. |

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| **Test Case ID** | 4.11 |
| **Test Case Name** | Accessibility - Screen Reader Compatibility |
| **Test Data** | Application with screen reader software. |
| **Pre-Condition** | Screen reader software is installed and functional. |
| **Actions** | 1. User navigates through the application using a screen reader. 2. Test all UI components. |
| **Expected Result** | Screen reader should read all UI elements correctly. |
| **Actual Result** | Screen reader reads all UI elements accurately. |

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| **Test Case ID** | 4.12 |
| **Test Case Name** | Resource Utilization - CPU and Memory Usage |
| **Test Data** | Run application with peak load. |
| **Pre-Condition** | Application is running with user load. |
| **Actions** | 1. Monitor CPU and memory usage during peak operations. |
| **Expected Result** | CPU usage should not exceed 80%, and memory usage should remain within limits. |
| **Actual Result** | CPU usage peaked at 75%, and memory usage was within limits. |
| **Test Case Status** | Pass |

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| **Test Case ID** | 4.13 |
| **Test Case Name** | User Load - Maximum Concurrent Users |
| **Test Data** | Simulate maximum user capacity. |
| **Pre-Condition** | System is prepared for stress testing. |
| **Actions** | 1. Simulate maximum user capacity (e.g., 1000 users). |
| **Expected Result** | System should remain functional without performance degradation. |
| **Actual Result** | System remained functional with minor delays. |
| **Test Case Status** | Pass |

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| **Test Case ID** | 4.14 |
| **Test Case Name** | Error Handling - System Response to Invalid Input |
| **Test Data** | Invalid user input data. |
| **Pre-Condition** | User is in the input phase. |
| **Actions** | 1. User submits invalid input data. 2. Observe system behavior. |
| **Expected Result** | System should display an appropriate error message. |
| **Actual Result** | System displayed an appropriate error message. |

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| **Test Case ID** | 4.15 |
| **Test Case Name** | System Backup - Backup Schedule Functionality |
| **Test Data** | Scheduled backup configuration. |
| **Pre-Condition** | Backup configuration is set. |
| **Actions** | 1. Check if backups occur at scheduled times. 2. Verify backup integrity. |
| **Expected Result** | Backups should occur as scheduled with no errors. |
| **Actual Result** | Backups occurred on schedule with no errors. |

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| **Test Case ID** | 4.16 |
| **Test Case Name** | Application Startup Time |
| **Test Data** | Application launch process. |
| **Pre-Condition** | Application is not running. |
| **Actions** | 1. Measure the time taken for the application to fully load. |
| **Expected Result** | Application should start within 5 seconds. |
| **Actual Result** | Application started in 4.2 seconds. |
| **Test Case Status** | Pass |

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| **Test Case ID** | 4.17 |
| **Test Case Name** | Data Integrity - Data Validation Before Save |
| **Test Data** | User input data. |
| **Pre-Condition** | User has entered data into the form. |
| **Actions** | 1. User submits the data form. 2. System validates data before saving. |
| **Expected Result** | System should validate data and prevent saving invalid entries. |
| **Actual Result** | System successfully prevented saving invalid entries. |

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| **Test Case ID** | 4.18 |
| **Test Case Name** | User Interface - Text Readability |
| **Test Data** | Text display in different sections. |
| **Pre-Condition** | Application is loaded with UI elements. |
| **Actions** | 1. Review text readability across different sections. |
| **Expected Result** | Text should be legible with appropriate font size and contrast. |
| **Actual Result** | Text is legible with good contrast. |
| **Test Case Status** | Pass |

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| **Test Case ID** | 4.19 |
| **Test Case Name** | Session Timeout Handling |
| **Test Data** | User session settings. |
| **Pre-Condition** | User is logged into the system. |
| **Actions** | 1. Leave the application idle for the session timeout period. 2. Observe system behavior. |
| **Expected Result** | User should be logged out after the timeout period. |
| **Actual Result** | User was logged out after the timeout period. |

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| **Test Case ID** | 4.20 |
| **Test Case Name** | System Notifications - Alerts and Messages |
| **Test Data** | Different system events triggering alerts. |
| **Pre-Condition** | User is active in the application. |
| **Actions** | 1. Trigger various events (e.g., data submission, errors). 2. Observe system notifications. |
| **Expected Result** | System should display appropriate alerts and messages in a timely manner. |
| **Actual Result** | System displayed appropriate alerts and messages timely. |

Test Environment: Windows 11, Chrome

Tested by: Muaaz Bin Mukhtar

Date: 07/10/2024