**Quality Assurance Report for Factorial Calculator Web Application**

**Overview**

This report outlines the findings from the testing of the Factorial Calculator web application. The application is designed to calculate the factorial of integer inputs and provide corresponding outputs. The testing covered various scenarios, including boundary conditions, error handling, and UI elements.

**Findings**

**1. Input Validation**

* **Negative Integers (-1 and below)**:
  + **Expected Behavior**: The application should display an error message or warning indicating that the input is invalid.
  + **Actual Behavior**: No message is rendered. The API endpoint https://qainterview.pythonanywhere.com/factorial returns a **500 Internal Server Error**.
* **Integers above 991**:
  + **Expected Behavior**: Similar to negative integers, the application should display an appropriate error message for values greater than 991.
  + **Actual Behavior**: No message is rendered, and the no result is given.
* **Input Validation Message Persistence**:
  + When an invalid input triggers a validation message ("Please enter an integer"), this message does not clear when subsequently entering a negative integer or a number greater than 991. It only clears when a valid integer between -0 and 991 is entered.

**2. Factorial Calculation Results**

* **Valid Input Behavior**:
  + **For integers from 0 to 21**: Returns whole number factorials.
  + **For integers from 22 to 170**: Returns results in scientific notation (e.g., "The factorial of 22 is: 1.1240007277776077e+21").
  + **For integers greater than 170**: Returns "Infinity."
* **Integer above 992**:
  + Similar to negative integers – Which can be considered an invalid partition, no UI message is displayed, and no result is returned.

**3. Hyperlink Issues**

* The "Ts&Cs" hyperlink redirects to "Privacy" and vice versa. This creates a confusing navigation experience for users.

**4. Page Title**

* The browser tab displays "Factoriall" instead of the correct title "Factorial," which can confuse users regarding the application name – This can also be found in the automated tests.

**5. Copyright Information**

* The copyright information shows "© Qxf2 Services 2024 - 2024" instead of "© Qxf2 Services 2016 - 2024," which is incorrect.

**Defects Documented**

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| --- | --- | --- | --- | --- |
| Defect ID | Summary | Severity | Status | Steps to Reproduce |
| DEF-001 | No error message for negative integers | Major | Open | 1. Input -1 into the input box. 2. Click the Calculate button. 3. Observe no error message. |
| DEF-002 | No error message for integers above 991 | Major | Open | 1. Input 992 into the input box. 2. Click the Calculate button. 3. Observe no error message. |
| DEF-003 | Input validation message persists incorrectly | Minor | Open | 1. Trigger the input validation with an invalid number. 2. Enter a negative number. 3. Observe persistence of message. |
| DEF-004 | Hyperlinks for Ts&Cs and Privacy are incorrect | Minor | Open | 1. Click on the Ts&Cs link. 2. Observe that it redirects to the Privacy page. |
| DEF-005 | Incorrect page title displayed in browser | Minor | Open | 1. Open the web application. 2. Observe the title in the browser tab. |
| DEF-006 | Incorrect copyright year displayed | Minor | Open | 1. Check the copyright information on the page. 2. Observe incorrect year displayed. |

**Boundary Value Analysis**

Boundary Value Analysis (BVA) focuses on testing values at the edge of input ranges. In this case, we consider the following ranges for input values:

1. **Negative Integers**: Test for -1, -0.
2. **Valid Range**: Test for 0, 1, 21 (valid whole number factorials).
3. **Transition Values**: Test for 22 (transition to scientific notation).
4. **Infinity Values**: Test for 170 (returns Infinity) and values above 170, such as 171, 999.
5. **Above Limit**: Test for 992 and above (returns no response).

**Conclusion**

The testing identified several critical issues that need to be addressed, including error handling for invalid inputs, hyperlink misdirection, and incorrect UI elements. These defects may impact user experience and functionality and should be prioritized for resolution.

This report provides a structured approach to the testing findings, defect documentation, and analysis of boundary conditions for the Factorial Calculator web application.