

1.Introduction to Testing:

- Software testing is the process of evaluating software to identify defects or bugs before it is deployed. It ensures that the software meets the specified requirements and functions correctly.
- Testing is important in software development as it helps in identifying and fixing issues early in the development process, which improves the reliability and correctness of the software.

2.Purpose of Testing:

- The primary purpose of testing is to identify defects early in the development process to reduce the cost and effort required to fix them later.
- Testing also aims to verify that software components perform as intended and meet the specified requirements.

3.Focus on Testing a Single Component:

- The chosen component for testing is the **calculateSkinType** function from the **skinTypeController** module.
- Testing this component is important because it plays a critical role in determining the skin type based on user responses. Any defects or errors in this function could lead to incorrect skin type classifications, affecting the overall functionality of the software and product recommendation engine.

4.Preparing Test Cases:

- Test cases should cover various scenarios, including normal inputs, edge cases, and invalid inputs.
- Examples of test cases for the calculateSkinType function include responses for oily skin, dry skin, combination skin, sensitive skin, acne-prone skin, and hyperpigmentation skin.

5.Choosing Testing Frameworks:

- The testing framework used here appears to be Jest, a popular testing framework for JavaScript.
- Jest provides a robust set of features for writing and executing tests, making it suitable for unit testing in JavaScript environments.

6.Writing Test Code:

- The provided test code demonstrates how to write test cases for the calculateSkinType function.
- Each test case uses the test function provided by Jest to define a test scenario and expect to assert the expected outcome.
- Assertions are made to validate that the function returns the expected skin type based on the provided responses.

7.Running Tests:

- Tests can be executed using the Jest testing framework by running the command **npm run test**
- The test results will indicate whether each test case passed, failed, or encountered errors.

8.Test Coverage:

- Achieving high test coverage is essential to ensure thorough testing of the software.
- Test coverage metrics can be used to measure the percentage of code that is

exercised by the tests, helping identify areas of the codebase that require additional testing.

Tests passing screenshot:

```
(node:43070) [DEP0040] DeprecationWarning: The `punycode` module is deprecated. Please use a userland alternative instead.
(Use `node --trace-deprecation ...` to show where the warning was created)
PASS controllers/skinTypeController.test.js
  calculate skin type module
    ✓ oily skin type response (3 ms)
    ✓ dry skin type response
    ✓ combination skin type response
    ✓ sensitive skin type response (1 ms)
    ✓ acne prone skin type response
    ✓ dry acne prone skin type response
    ✓ get highest score skin type (1 ms)

Test Suites: 1 passed, 1 total
Tests:       7 passed, 7 total
Snapshots:   0 total
Time:        0.931 s, estimated 1 s
Ran all test suites related to changed files.
```

Here is the test code:

```
const { calculateSkinType, getHighestScoreSkinType } =
require('./skinTypeController');

const oilySkinResponse = {
  'How often does your skin feel shiny?': 'Sometimes',
  'How often do you have enlarged pores?': 'Frequently',
  'How often do you have blackheads or breakouts?': 'Frequently',
  'How often does your skin feel tight or dry?': 'Sometimes',
  'How often do you use a moisturizer?': 'Twice a day',
  'How often does your skin look flaky or ashy?': 'Sometimes',
  'Do you experience oily skin in certain areas and dryness in others?':
'Sometimes',
  'How often do you experience redness or irritation?': 'Rarely',
  'How often does your skin react to new products or environmental changes?':
'Rearely',
  'How often do you have breakouts?': 'Rarely',
  'How often do you have inflamed or cystic acne?': 'Rarely',
  'Do you have dark spots or patches on your skin?': 'No',
  'How often do you have post-inflammatory hyperpigmentation (dark marks after acne
or injury)?': 'Rarely',
  'How often does your skin appear uneven in tone or texture?': 'Rarely',
};

const drySkinResponse = {
  'How often does your skin feel shiny?': 'Rarely',
  'How often do you have enlarged pores?': 'Rarely',
  'How often do you have blackheads or breakouts?': 'Rarely',
  'How often does your skin feel tight or dry?': 'Sometimes',
```

```
'How often do you use a moisturizer?': 'Twice a day',
'How often does your skin look flaky or ashy?': 'Sometimes',
  'Do you experience oily skin in certain areas and dryness in others?':
'Sometimes',
'How often do you experience redness or irritation?': 'Rarely',
  'How often does your skin react to new products or environmental changes?':
'Rearely',
'How often do you have breakouts?': 'Rarely',
'How often do you have inflamed or cystic acne?': 'Rarely',
'Do you have dark spots or patches on your skin?': 'No',
  'How often do you have post-inflammatory hyperpigmentation (dark marks after acne
or injury)?': 'Rarely',
  'How often does your skin appear uneven in tone or texture?': 'Rarely',
);
```

```
const combinationSkinResponse = {
  'How often does your skin feel shiny?': 'Sometimes',
  'How often do you have enlarged pores?': 'Sometimes',
  'How often do you have blackheads or breakouts?': 'Sometimes',
  'How often does your skin feel tight or dry?': 'Sometimes',
  'How often do you use a moisturizer?': 'Twice a day',
  'How often does your skin look flaky or ashy?': 'Rarely',
  'Do you experience oily skin in certain areas and dryness in others?':
'Frequently',
  'How often do you experience redness or irritation?': 'Sometimes',
  'How often does your skin react to new products or environmental changes?':
'Sometimes',
  'How often do you have breakouts?': 'Sometimes',
  'How often do you have inflamed or cystic acne?': 'Rarely',
  'Do you have dark spots or patches on your skin?': 'No',
  'How often do you have post-inflammatory hyperpigmentation (dark marks after acne
or injury)?': 'Rarely',
  'How often does your skin appear uneven in tone or texture?': 'Rarely',
};
```

```
const sensitiveSkinResponse = {
  'How often does your skin feel shiny?': 'Rarely',
  'How often do you have enlarged pores?': 'Rarely',
  'How often do you have blackheads or breakouts?': 'Rarely',
  'How often does your skin feel tight or dry?': 'Sometimes',
  'How often do you use a moisturizer?': 'Twice a day',
  'How often does your skin look flaky or ashy?': 'Sometimes',
```

```
'Do you experience oily skin in certain areas and dryness in others?': 'Rarely',
'How often do you experience redness or irritation?': 'Frequently',
'How often does your skin react to new products or environmental changes?':
'Frequently',
'How often do you have breakouts?': 'Rarely',
'How often do you have inflamed or cystic acne?': 'Rarely',
'Do you have dark spots or patches on your skin?': 'No',
'How often do you have post-inflammatory hyperpigmentation (dark marks after acne
or injury)?': 'Rarely',
'How often does your skin appear uneven in tone or texture?': 'Rarely',
};
```

```
const acneProneSkinResponse = {
  'How often does your skin feel shiny?': 'Sometimes',
  'How often do you have enlarged pores?': 'Sometimes',
  'How often do you have blackheads or breakouts?': 'Rarely',
  'How often does your skin feel tight or dry?': 'Sometimes',
  'How often do you use a moisturizer?': 'Once a day',
  'How often does your skin look flaky or ashy?': 'Sometimes',
  'Do you experience oily skin in certain areas and dryness in others?':
'Sometimes',
  'How often do you experience redness or irritation?': 'Sometimes',
  'How often does your skin react to new products or environmental changes?':
'Rearely',
  'How often do you have breakouts?': 'Frequently',
  'How often do you have inflamed or cystic acne?': 'Frequently',
  'Do you have dark spots or patches on your skin?': 'No',
  'How often do you have post-inflammatory hyperpigmentation (dark marks after acne
or injury)?': 'Rarely',
  'How often does your skin appear uneven in tone or texture?': 'Sometimes',
};
```

```
const hyperpigmentationSkinResponse = {
  'How often does your skin feel shiny?': 'Rarely',
  'How often do you have enlarged pores?': 'Rarely',
  'How often do you have blackheads or breakouts?': 'Sometimes',
  'How often does your skin feel tight or dry?': 'Sometimes',
  'How often do you use a moisturizer?': 'Twice a day',
  'How often does your skin look flaky or ashy?': 'Sometimes',
  'Do you experience oily skin in certain areas and dryness in others?': 'Rarely',
  'How often do you experience redness or irritation?': 'Sometimes',
  'How often does your skin react to new products or environmental changes?':
```

```
'Sometimes',
  'How often do you have breakouts?': 'Sometimes',
  'How often do you have inflamed or cystic acne?': 'Sometimes',
  'Do you have dark spots or patches on your skin?': 'Yes',
  'How often do you have post-inflammatory hyperpigmentation (dark marks after acne
or injury)?': 'Sometimes',
  'How often does your skin appear uneven in tone or texture?': 'Sometimes',
};

describe('calculate skin type module', () => {
  test('oily skin type response', () => {
    const skinType = calculateSkinType(oilySkinResponse);
    expect(skinType).toEqual({
      skinType: 'oily',
    });
  });
});

test('dry skin type response', () => {
  const skinType = calculateSkinType(drySkinResponse);
  expect(skinType).toEqual({
    skinType: 'dry',
  });
});

test('combination skin type response', () => {
  const skinType = calculateSkinType(combinationSkinResponse);
  expect(skinType).toEqual({
    skinType: 'combination',
  });
});

test('sensitive skin type response', () => {
  const skinType = calculateSkinType(sensitiveSkinResponse);
  expect(skinType).toEqual({
    skinType: 'sensitive',
  });
});

test('acne prone skin type response', () => {
  const skinType = calculateSkinType(acneProneSkinResponse);
  expect(skinType).toEqual({
```

```
        skinType: 'acne_prone_skin',
    });
});

test('dry acne prone skin type response', () => {
    const skinType = calculateSkinType(hyperpigmentationSkinResponse);
    expect(skinType).toEqual({
        skinType: 'hyperpigmentation',
    });
});

test('get highest score skin type', () => {
    let scores = {
        oily: 1,
        dry: 3,
        combination: 0,
        sensitive: 6,
        acne_prone_skin: 7,
        dry_acne_prone_skin: 4,
        hyperpigmentation: 9,
    };
    const highestScoreSkinType = getHighestScoreSkinType(scores);
    expect(highestScoreSkinType).toEqual('hyperpigmentation');
    expect(highestScoreSkinType).not.toEqual('acne_prone_skin');
    expect(highestScoreSkinType).not.toEqual('sensitive');
});
});
```