



# JavaScript Form Validation

**Summary:** in this tutorial, you'll learn about JavaScript form validation by building a signup form from scratch.

## What is form validation

Before [submitting data to the server](https://www.javascripttutorial.net/javascript-dom/javascript-form/) (<https://www.javascripttutorial.net/javascript-dom/javascript-form/>) , you should check the data in the web browser to ensure that the submitted data is in the correct format.

To provide quick feedback, you can use JavaScript to validate data. This is called client-side validation.

If you don't carry the client-side validation, it may cause a bad user experience. In this case, you may feel a noticeable delay because it takes time for the form data to transfer between the web browsers and the server.

Unlike the client-side validation that performs in the web browser, the server-side validation is performed on the server. It's critical always to implement the server-side validation.

The reason is that client-side validation is quite easy to bypass. Malicious users can disable JavaScript and submit bad data to your server.

In this tutorial, you're going to focus on the client-side validation only.

## Client-side validation options

When it comes to client-side validation, you'll have two options:

- JavaScript validation: you develop the validation logic using JavaScript. Or you can use a library to do so.
- Built-in form validation: you can use the HTML5 form validation features. This validation has a better performance than JavaScript validation. However, it isn't as customizable as JavaScript validation.

## JavaScript validation

You will create a simple signup form with four input fields: username, email, password, and confirm password.

When you click the sign up without filling anything or filling incorrect data format, the form will show error messages:

**Sign Up**

Username:

Username must be between 3 and 25 characters.

Email:

Password:

Password must has at least 8 characters that include at least 1 lowercase character, 1 uppercase characters, 1 number, and 1 special character in (!@#\$\$%^&\*)

Confirm Password:

Please enter the password again

**SIGN UP**

(<https://javascripttutorial.net/sample/dom/form-validation/>)

You'll validate the following:

- Username cannot be blank and has at least 3 characters and cannot be longer than 25 characters.
- Email is mandatory and valid.
- Password has eight characters or longer. And it must contain 1 lowercase character, 1 uppercase character, 1 number, and at least one special character in this set ( `!@#$$%^&*` ).
- The confirm password must be the same as the password.

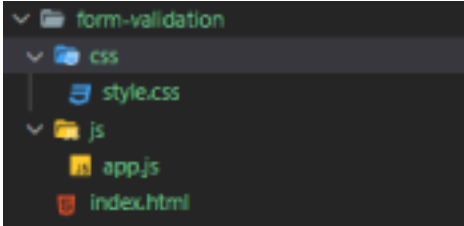
## Create the project structure

First, create the `form-validation` folder that stores all the source code files of the project.

Second, create the `js` and `css` folders inside the `form-validation` folder.

Third, create the `style.css` in the `css` folder, the `app.js` in the `js` folder, and `index.html` directly in the `form-validation` folder.

The final project structure will look like this:



## Build the HTML form

First, open the `index.html` file and enter the following code:

```
<!DOCTYPE html>

<html>
<head>
  <title>JavaScript Form Validation Demo</title>
  <link rel="stylesheet" href="css/style.css">
</head>
<body>

  <script src="js/app.js"></script>
</body>

</html>
```

In this HTML file, we place the `style.css` file in the `head` section and `app.js` file in the body section before the closing `</body>` tag.

Second, add the following HTML markup to create the signup form. The final index.html file will look like the following:

```
<!DOCTYPE html>

<html>
<head>
  <title>JavaScript Form Validation Demo</title>
  <link rel="stylesheet" href="css/style.css">
</head>
<body>
  <div class="container">
    <form id="signup" class="form">
      <h1>Sign Up</h1>
      <div class="form-field">
        <label for="username">Username:</label>
        <input type="text" name="username" id="username" autocomplete="off">
        <small></small>
      </div>

      <div class="form-field">
        <label for="email">Email:</label>
        <input type="text" name="email" id="email" autocomplete="off">
        <small></small>
      </div>

      <div class="form-field">
        <label for="password">Password:</label>
        <input type="password" name="password" id="password" autocomplete="off">
        <small></small>
      </div>

      <div class="form-field">
        <label for="confirm-password">Confirm Password:</label>
        <input type="password" name="confirm-password" id="confirm-password" autocomplete="off">
        <small></small>
      </div>

      <div class="form-field">
        <input type="submit" value="Sign Up">
      </div>
    </form>
```

```
    </div>

    <script src="js/app.js"></script>
</body>
</html>
```

The notable thing about the signup form is that each field is wrapped in a `div` with the class `form-field`.

Each form field has three elements:

- A label
- An input field
- A `<small>` element

You'll use the `<small>` tag to show the error message to the users.

If an input field isn't valid, we'll make its border color red by adding the `error` class to the `form-field` element. It'll look like this:

```
<div class="form-field error">
  <label for="username">Username:</label>
  <input type="text" name="username" id="username" autocomplete="off">
  <small></small>
</div>
```

If the value of an input field is valid, then we'll make its border color green by adding the `success` class to the `form-field` element as follows:

```
<div class="form-field success">
  <label for="username">Username:</label>
  <input type="text" name="username" id="username" autocomplete="off">
  <small></small>
</div>
```

Check out the [style.css](https://javascripttutorial.net/sample/dom/form-validation/css/style.css) (<https://javascripttutorial.net/sample/dom/form-validation/css/style.css>) for details of the `.error` and `.success` classes.

## Select the form fields and add the submit event listener

In the `app.js` file, you'll first use the `document.querySelector()` (<https://www.javascripttutorial.net/javascript-dom/javascript-queryselector/>) method to select the input fields and the form:

```
const usernameEl = document.querySelector('#username');
const emailEl = document.querySelector('#email');
const passwordEl = document.querySelector('#password');
const confirmPasswordEl = document.querySelector('#confirm-password');

const form = document.querySelector('#signup');
```

And then you attach the `submit` (<https://www.javascripttutorial.net/javascript-dom/javascript-form/>) event listener to the form by using the `addEventListener()` (<https://www.javascripttutorial.net/dom/events/add-an-event-handler/>) method:

```
form.addEventListener('submit', function (e) {
  // prevent the form from submitting
  e.preventDefault();

});
```

In the event listener, you need to call the `e.preventDefault()` (<https://www.javascripttutorial.net/dom/events/prevent-default-action-of-events/>) to prevent the form from submitting once the submit button is clicked.

## Develop utility functions

Before validating the form, you can develop some reusable utility functions to check if:

- A field is required.
- The length of a field is between min and max.
- The email is in a valid format.
- The password is strong.

The following `isRequired()` function returns true if the input argument is empty:

```
const isRequired = value => value === '' ? false : true;
```

The following `isBetween()` function returns false if the `length` argument is not between the `min` and `max` argument:

```
const isBetween = (length, min, max) => length < min || length > max ? false : true;
```

To check the email is valid, you'll use a [regular expression](https://www.javascripttutorial.net/javascript-regular-expression/) (https://www.javascripttutorial.net/javascript-regular-expression/) :

```
const isEmailValid = (email) => {
  const re = /^[^<>()\[\]\\. ,;: \s@"]+(\.[^<>()\[\]\\. ,;: \s@"]+)*|(\".+\")@((\[[0-9]{1,3}\.[0-9]{1,3}\.
  return re.test(email);
};
```

To check if a password is strong, which match a specified pattern, you'll also use a regular expression:

```
const isPasswordSecure = (password) => {
  const re = new RegExp("(^(?=.*[a-z])(?=.*[A-Z])(?=.*[0-9])(?=.*[!@#\\$%^&*])?(?=.{8,})");
  return re.test(password);
};
```

The following table illustrates the meaning of each part of the regular expression used to validate the password:

| Password RegEx                     | Meaning  |
|------------------------------------|--|
| <code>^</code>                     | The password starts  |
| <code>(?=.*[a-z])</code>           | The password must contain at least one lowercase character |
| <code>(?=.*[A-Z])</code>           | The password must contain at least one uppercase character |
| <code>(?=.*[0-9])</code>           | The password must contain at least one number              |
| <code>(?=.*[!@#\$%^&amp;*])</code> | The password must contain at least one special character.  |
| <code>(?=.{8,})</code>             | The password must be eight characters or longer            |

## Develop functions that show the error / success

The following `showError()` function highlights the border of the input field and displays an error message if the input field is invalid:

```
const showError = (input, message) => {
  // get the form-field element
  const formField = input.parentElement;
  // add the error class
  formField.classList.remove('success');
  formField.classList.add('error');
```

```
    // show the error message
    const error = formField.querySelector('small');
    error.textContent = message;
  };
```

How it works.

First, get the [parent element](https://www.javascripttutorial.net/javascript-dom/javascript-get-parent-element-parentnode/) of the input field, which is the `<div>` element that contains the `form-field` class:

```
const formField = input.parentElement;
```

Second, remove the `success` class and add the `error` class to the `form-field` element:

```
formField.classList.remove('success');
formField.classList.add('error');
```

Third, select the `<small>` element inside the `form-field` element:

```
const error = formField.querySelector('small');
```

Notice that you use the `formField.querySelector()` instead of the `document.querySelector()`.

Finally, set the error message to its `textContent` property of the `<small>` element:

```
error.textContent = message;
```

The function that shows the success indicator is similar to the `showError()` function:

```
const showSuccess = (input) => {
  // get the form-field element
  const formField = input.parentElement;

  // remove the error class
  formField.classList.remove('error');
  formField.classList.add('success');

  // hide the error message
  const error = formField.querySelector('small');
  error.textContent = '';
}
```

Unlike the `showError()` function, the `showSuccess()` function removes the `error` class, adds the `success` class, and set the error message to blank.

Now, you can use the utility function above to check for each field.

## Develop input field validating functions

You'll develop four functions for validating values of the form fields:

### 1) Validate the username field

The following `checkUsername()` function uses:

- The `isRequired()` function to check if the username is provided.
- The `isBetween()` function to check if the length of the username is between 3 and 25 characters.

- The `showError()` and `showSuccess()` functions to show the error and success indicator.

The function returns `true` if the field passes the checks.

```
const checkUsername = () => {  
  
  let valid = false;  
  const min = 3,  
        max = 25;  
  const username = usernameEl.value.trim();  
  
  if (!isRequired(username)) {  
    showError(usernameEl, 'Username cannot be blank.');  } else if (!isBetween(username.length, min, max)) {  
    showError(usernameEl, `Username must be between ${min} and ${max} characters.`)  
  } else {  
    showSuccess(usernameEl);  
    valid = true;  
  }  
  return valid;  
}
```

## 2) Validate the email field

The `checkEmail()` function returns `true` if the email is provided and valid.

It uses the `isRequired()` and `isEmailValid()` functions for checking. And it uses the `showError()` and `showSuccess()` functions to provide feedback in case of error and success.

```
const checkEmail = () => {  
  let valid = false;  
  const email = emailEl.value.trim();  
  if (!isRequired(email)) {  
    showError(emailEl, 'Email cannot be blank.');  } else if (!isEmailValid(email)) {  
    showError(emailEl, 'Email is not valid.')  } else {  
    showSuccess(emailEl);  
    valid = true;  
  }  
  return valid;  
}
```

## 3) Validate the password field

The following `checkPassword()` function checks the password field if it is provided and match the required format:

```
const checkPassword = () => {  
  
  let valid = false;  
  
  const password = passwordEl.value.trim();  
  
  if (!isRequired(password)) {  
    showError(passwordEl, 'Password cannot be blank.');  } else if (!isPasswordSecure(password)) {  
    showError(passwordEl, 'Password must has at least 8 characters that include at least 1 lowercase c  
  } else {
```

```
        showSuccess(passwordEl);
        valid = true;
    }

    return valid;
};
```

#### 4) Validate the confirm password field

The `checkConfirmPassword()` function checks if the confirm password is the same as the password.

```
const checkConfirmPassword = () => {
    let valid = false;
    // check confirm password
    const confirmPassword = confirmPasswordEl.value.trim();
    const password = passwordEl.value.trim();

    if (!isRequired(confirmPassword)) {
        showError(confirmPasswordEl, 'Please enter the password again');
    } else if (password !== confirmPassword) {
        showError(confirmPasswordEl, 'Confirm password does not match');
    } else {
        showSuccess(confirmPasswordEl);
        valid = true;
    }

    return valid;
};
```

### Modifying the submit event handler

Now, you can use the functions that validate the input fields in the submit event handler:

```
form.addEventListener('submit', function (e) {
    // prevent the form from submitting
    e.preventDefault();

    // validate forms
    let isUsernameValid = checkUsername(),
        isEmailValid = checkEmail(),
        isPasswordValid = checkPassword(),
        isConfirmPasswordValid = checkConfirmPassword();

    let isFormValid = isUsernameValid &&
        isEmailValid &&
        isPasswordValid &&
        isConfirmPasswordValid;

    // submit to the server if the form is valid
    if (isFormValid) {

    }
});
```

How it works:

- First, call each individual function to validate username, email, password, and confirm password fields.



- Second, use the `&&` operator to determine if the form is valid. The form is valid only if all fields are valid.
- Finally, submit data to the server if the form is valid specified the `isValid` flag. Note that submitting form data to the server isn't covered in this tutorial.

Now, you can open the `index.html` file, enter some values and click the submit button to test it.

## Add Instant feedback feature

The form only shows the error or success when you click the **Sign Up** button.

To provide instant feedback, you can attach an event listener to the `input` (<https://www.javascripttutorial.net/javascript-dom/javascript-input-event/>) event of each field and validate it.

It's even better to use the [event delegation](https://www.javascripttutorial.net/javascript-dom/javascript-event-delegation/) (<https://www.javascripttutorial.net/javascript-dom/javascript-event-delegation/>) so that you attach the `input` event listener to the form and validate each field based on the current field id, like this:

```
form.addEventListener('input', function (e) {  
  switch (e.target.id) {  
    case 'username':  
      checkUsername();  
      break;  
    case 'email':  
      checkEmail();  
      break;  
    case 'password':  
      checkPassword();  
      break;  
    case 'confirm-password':  
      checkConfirmPassword();  
      break;  
  }  
});
```

If you open the `index.html` and enter some data, you'll see that the form shows the feedback either error or success instantly.

Also, you improve the performance of the form by using the debouncing technique.

Technically, you'll wait for the users to pause the typing for a small amount of time or stop typing before validating the input.

For the detail of the debouncing technique, check it out in [this tutorial](https://www.javascripttutorial.net/javascript-dom/javascript-debounce/). (<https://www.javascripttutorial.net/javascript-dom/javascript-debounce/>)

The following illustrates the `debounce()` function:

```
const debounce = (fn, delay = 500) => {  
  let timeoutId;  
  return (...args) => {  
    // cancel the previous timer  
    if (timeoutId) {  
      clearTimeout(timeoutId);  
    }  
    // setup a new timer  
    timeoutId = setTimeout(() => {  
      fn.apply(null, args)  
    }, delay);  
  };  
};
```

Now, you can pass the `input` event handler to the `debounce()` function to debounce it:

```
form.addEventListener('input', debounce(function (e) {
```

```
    switch (e.target.id) {
      case 'username':
        checkUsername();
        break;
      case 'email':
        checkEmail();
        break;
      case 'password':
        checkPassword();
        break;
      case 'confirm-password':
        checkConfirmPassword();
        break;
    }
  }
}));
```

If you enter data to a form field to trigger the `input` event, you'll see that the error or success message will have a bit of delay.

The following shows the complete `app.js` file:

```
const usernameEl = document.querySelector('#username');
const emailEl = document.querySelector('#email');
const passwordEl = document.querySelector('#password');
const confirmPasswordEl = document.querySelector('#confirm-password');

const form = document.querySelector('#signup');

const checkUsername = () => {

  let valid = false;

  const min = 3,
        max = 25;

  const username = usernameEl.value.trim();

  if (!isRequired(username)) {
    showError(usernameEl, 'Username cannot be blank.');
  } else if (!isBetween(username.length, min, max)) {
    showError(usernameEl, `Username must be between ${min} and ${max} characters.`)
  } else {
    showSuccess(usernameEl);
    valid = true;
  }
  return valid;
};

const checkEmail = () => {
  let valid = false;
  const email = emailEl.value.trim();
  if (!isRequired(email)) {
    showError(emailEl, 'Email cannot be blank.');
  } else if (!isEmailValid(email)) {
    showError(emailEl, 'Email is not valid.')
  } else {
    showSuccess(emailEl);
  }
};
```

```
        valid = true;
    }
    return valid;
};

const checkPassword = () => {
    let valid = false;

    const password = passwordEl.value.trim();

    if (!isRequired(password)) {
        showError(passwordEl, 'Password cannot be blank.');
```

```
    } else if (!isPasswordSecure(password)) {
        showError(passwordEl, 'Password must has at least 8 characters that include at least 1 lowercase c
    } else {
        showSuccess(passwordEl);
        valid = true;
    }

    return valid;
};

const checkConfirmPassword = () => {
    let valid = false;
    // check confirm password
    const confirmPassword = confirmPasswordEl.value.trim();
    const password = passwordEl.value.trim();

    if (!isRequired(confirmPassword)) {
        showError(confirmPasswordEl, 'Please enter the password again');
```

```
    } else if (password !== confirmPassword) {
        showError(confirmPasswordEl, 'The password does not match');
```

```
    } else {
        showSuccess(confirmPasswordEl);
        valid = true;
    }

    return valid;
};

const isEmailValid = (email) => {
    const re = /^[^<>()\[\]\\. ,;:\s@""]+(\.[^<>()\[\]\\. ,;:\s@""]+)*|(".+")@((\[[0-9]{1,3}\.[0-9]{1,3}\.
    return re.test(email);
};

const isPasswordSecure = (password) => {
    const re = new RegExp("(?=.*[a-z])(?=.*[A-Z])(?=.*[0-9])(?=.*[!@#\\$%^&*])(?={8,})");
    return re.test(password);
};

const isRequired = value => value === '' ? false : true;
const isBetween = (length, min, max) => length < min || length > max ? false : true;

const showError = (input, message) => {
    // get the form-field element
```

```
const formField = input.parentElement;
// add the error class
formField.classList.remove('success');
formField.classList.add('error');

// show the error message
const error = formField.querySelector('small');
error.textContent = message;
};

const showSuccess = (input) => {
  // get the form-field element
  const formField = input.parentElement;

  // remove the error class
  formField.classList.remove('error');
  formField.classList.add('success');

  // hide the error message
  const error = formField.querySelector('small');
  error.textContent = '';
}

form.addEventListener('submit', function (e) {
  // prevent the form from submitting
  e.preventDefault();

  // validate fields
  let isUsernameValid = checkUsername(),
      isEmailValid = checkEmail(),
      isPasswordValid = checkPassword(),
      isConfirmPasswordValid = checkConfirmPassword();

  let isFormValid = isUsernameValid &&
    isEmailValid &&
    isPasswordValid &&
    isConfirmPasswordValid;

  // submit to the server if the form is valid
  if (isFormValid) {

  }
});

const debounce = (fn, delay = 500) => {
  let timeoutId;
  return (...args) => {
    // cancel the previous timer
    if (timeoutId) {
      clearTimeout(timeoutId);
    }
    // setup a new timer
    timeoutId = setTimeout(() => {
      fn.apply(null, args)
    }, delay);
  }
}
```

```
    };\n  });\n\n  form.addEventListener('input', debounce(function (e) {\n    switch (e.target.id) {\n      case 'username':\n        checkUsername();\n        break;\n      case 'email':\n        checkEmail();\n        break;\n      case 'password':\n        checkPassword();\n        break;\n      case 'confirm-password':\n        checkConfirmPassword();\n        break;\n    }\n  }));
```

And [here is the final form](https://javascripttutorial.net/sample/dom/form-validation/) (https://javascripttutorial.net/sample/dom/form-validation/) .

## Summary

- What client-side validation is and the difference between the client-side vs. server-side validation.
- How to compose a form and combine JavaScript and CSS to validate input fields.
- How to use [regular expressions](https://www.javascripttutorial.net/javascript-regular-expression/) (https://www.javascripttutorial.net/javascript-regular-expression/) to check if field values are in the correct format.
- How to use the [event delegation](https://www.javascripttutorial.net/javascript-dom/javascript-event-delegation/) (https://www.javascripttutorial.net/javascript-dom/javascript-event-delegation/) technique.
- How to use the [debouncing technique](https://www.javascripttutorial.net/javascript-dom/javascript-debounce/) (https://www.javascripttutorial.net/javascript-dom/javascript-debounce/) to improve the performance for the form validation.