



University of
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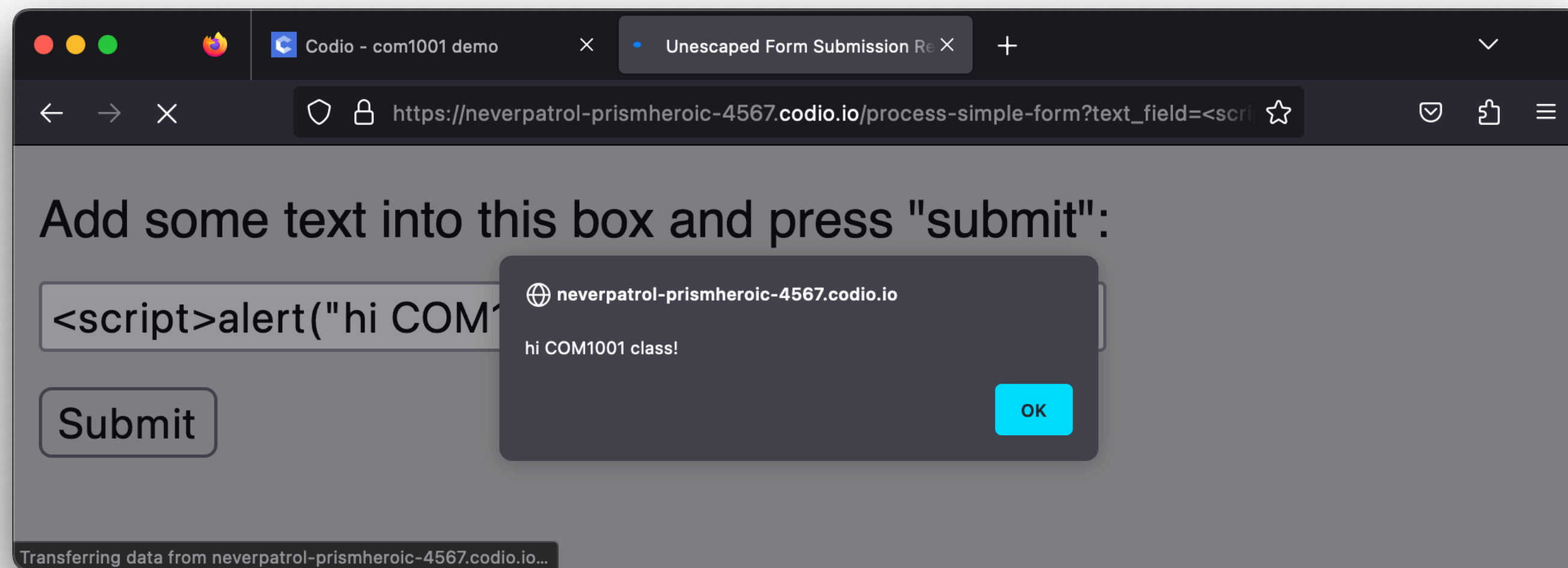
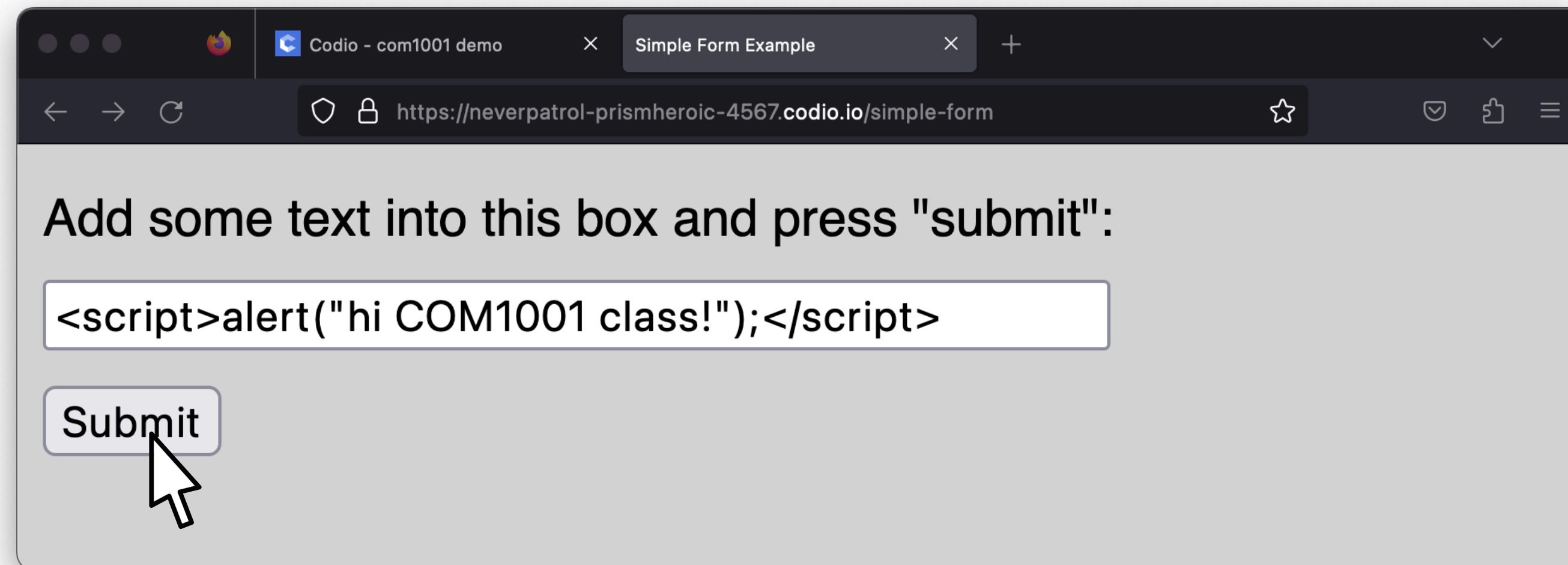
COM1001 SPRING SEMESTER

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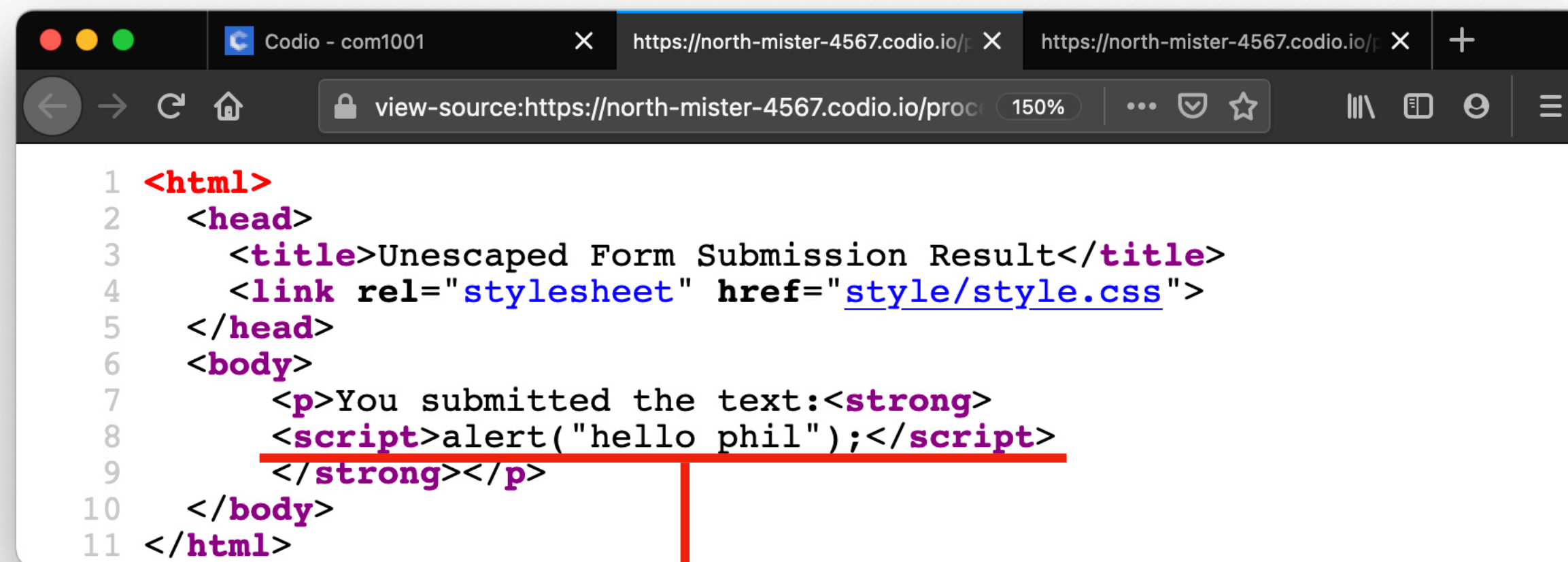
Sanitising and Validating User Inputs

Never Trust User Inputs!



What is Happening?

Let's Investigate the HTML Source of the Page



```
1 <html>
2 <head>
3   <title>Unescaped Form Submission Result</title>
4   <link rel="stylesheet" href="style/style.css">
5 </head>
6 <body>
7   <p>You submitted the text:<strong>
8     <script>alert("hello phil");</script>
9   </strong></p>
10 </body>
11 </html>
```

The text the user submitted is injected directly into the page and the browser has no way to distinguish it not page of the regular HTML.

As such, the browser dutifully runs the JavaScript in the `<script>` tags, launching an alert dialog, effectively hijacking our page!

How to view the source of the generated page:

Chrome: View → Developer → View Source

Firefox: Tools → Browser Tools → Page Source

Safari: Settings → Advanced → check that “Show features for web developers” is enabled; then Develop → Show Page Source

Others: Google it!

What Can We Do?

We need to avoid using certain characters that could be interpreted as being part of the HTML code of the page – but how?

HTML defines a set of **HTML entities** for so-called **HTML special characters** such as these, including angled brackets `<` and `>`.

HTML entities start with an `&` and end with a `;`. **The original character can be replaced with its equivalent HTML entity and the Browser will then know it's part of the content of the page, not the HTML formatting itself.**

For example `<` can be replaced with `<`; and `>` can be replaced with `>`;

So `<hello>` becomes `<hello>`;

This process of this sub-sequence replacement to ensure strings are interpreted correctly is often referred to as “**escaping**” the string. More generally, the process of making user inputs safe for use is called **sanitising inputs**.

Luckily Ruby has built in methods to do escaping for us, with minimum fuss.

Sanitisation with Escaping

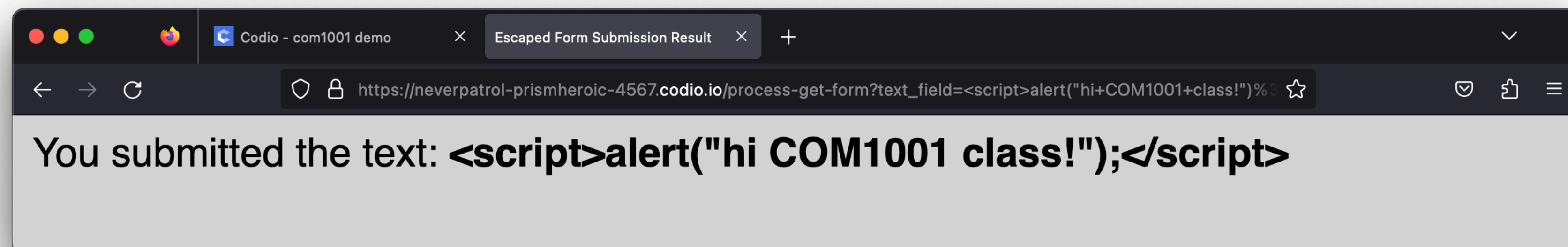
```
<html>
  <head>
    <title>Escaped Form Submission Result</title>
    <link rel="stylesheet" href="style/style.css">
  </head>
  <body>
    <% unless @submitted_text_field_value.nil? %>
      <p>You submitted the text:<strong>
        <%= h @submitted_text_field_value %>
      </strong></p>
    <% end %>
  </body>
</html>
```

We can escape HTML special characters using the `h` method.

(Need the line `include ERB::Util` in our main `app.rb` file to use this)

This will prevent the browser interpreting any user inputs as part of the HTML of the page, such as maliciously injecting scripts and potentially compromising the security of our web application.

Result:



Unescaped (view not using h):

```
1 <html>
2   <head>
3     <title>Unescaped Form Submission Result</title>
4     <link rel="stylesheet" href="style/style.css">
5   </head>
6   <body>
7     <p>You submitted the text:<strong>
8     <script>alert("hello phil");</script>
9     </strong></p>
10  </body>
11 </html>
```

Escaped (view uses h):

```
1 <html>
2   <head>
3     <title>Escaped Form Submission Result</title>
4     <link rel="stylesheet" href="style/style.css">
5   </head>
6   <body>
7     <p>You submitted the text:<strong>
8     &lt;script&gt;alert(&quot;hello phil&quot;);&lt;/script&gt;
9     </strong></p>
10  </body>
11 </html>
```

The Difference in the Page Source

Special HTML characters like “<” and “>” are replaced with equivalent HTML “entities” (< and > respectively) that will render those characters as text, so as not to confuse the browser into thinking they are part of the HTML of the page.

Other Types of Sanitisation

There are other types of data cleansing we might want to perform, depending on the application.

For example, **removing leading and trailing whitespace from a user's form entry.**

Extra spaces at the end of an entry for a person's name should not be counted as part of their name.

Nor are they part of an email address, or a telephone number.

Validation

We also need to validate user inputs.

Validation means checking the user entered the right kind of data before the application does any processing on it.

Some examples:

Important information is not missing, like the user left their name blank.

Numbers entered into forms are actually numbers.

Email addresses are in the right format

Recall the Times Table Example

```
get "/timestable" do
  # check if the "m" (multiplicand) value was supplied
  if params.key?("m")
    param = params["m"]

    # if the value is an integer (checked via a regular expression)
    if param.match?(/^(\d)+$/)
      # change the variable from a string to an integer type
      # and assign to @multiplicand
      @multiplicand = param.to_i
    end
  end

  # check the "l" (limit) value was supplied, and process
  # in the same way as the multiplicand value above
  if params.key?("l")
    param = params["l"]
    @limit = param.to_i if param.match?(/^(\d)+$/)
  end

  # if we have values for @multiplicand and @limit
  # at this point (that is, they are not nil) then we have
  # valid parameters (else, we do not)
  @params_valid = !@multiplicand.nil? && !@limit.nil?

  erb :times_table
end
```

The example took two strings from the query of the URL that needed to be numbers. Not validating they were actually numbers before doing multiplication would have caused the application to crash.

Regular expression check that parameter consists of digits

Conversion of string to integer if check passes



Live Demonstration:

`week2/sanitisation_validation_example`
(from the COM1001 GitHub repository)

Featuring:

- Validation and sanitisation of different form field types