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Exercise 11 - CSS Transitions and Animations

Intro - CSS Transitions

CSS transitions provide a way to control animation speed when changing CSS properties. Instead of having property changes take effect immediately, you can cause the changes in a property to take place over a period of time. For example, if you change the color of an element from white to black, usually the change is instantaneous. With CSS transitions enabled, changes occur at time intervals that follow an acceleration curve, all of which can be customized.

Animations that involve transitioning between two states are often called *implicit transitions* as the states in between the start and final states are implicitly defined by the browser.

CSS transitions let you decide which properties to animate (by *listing them explicitly*), when the animation will start (by setting a *delay)*, how long the transition will last (by setting a *duration*), and how the transition will run (by defining a *timing function*, e.g., linearly or quick at the beginning, slow at the end).

Which CSS properties can be transitioned?

The Web author can define which property has to be animated and in which way. This allows the creation of complex transitions. As it doesn't make sense to animate some properties, the list of animatable properties is limited to a finite set.

Note: The auto value is often a very complex case. The specification recommends not animating from and to auto. Some user agents, like those based on Gecko, implement this requirement and others, like those based on WebKit, are less strict. Using animations with auto may lead to unpredictable results, depending on the browser and its version, and should be avoided.

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Defining transitions

CSS Transitions are controlled using the shorthand transition property. This is the best way to configure transitions, as it makes it easier to avoid out of sync parameters, which can be very frustrating to have to spend lots of time debugging in CSS.

You can control the individual components of the transition with the following sub-properties:

transition-property

Specifies the name or names of the CSS properties to which transitions should be applied. Only properties listed here are animated during transitions; changes to all other properties occur instantaneously as usual.

transition-duration

Specifies the duration over which transitions should occur. You can specify a single duration that applies to all properties during the transition, or multiple values to allow each property to transition over a different period of time.

transition-timing-function

Specifies a function to define how intermediate values for properties are computed. *Timing functions* determine how intermediate values of the transition are calculated. Most timing functions can be specified by providing the graph of the corresponding function, as defined by four points defining a cubic bezier. You can also choose easing from Easing Functions Cheat Sheet.

transition-delay

Defines how long to wait between the time a property is changed and the transition actually begins.

```
div {
  transition: <property> <duration> <timing-function> <delay>;
}
```

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Example: Using transitions when highlighting menus

A common use of CSS is to highlight items in a menu as the user hovers the mouse cursor over them. It's easy to use transitions to make the effect even more attractive.

First, we set up the menu using HTML:

```
<nav>
  <a href="#">Home</a>
  <a href="#">About</a>
  <a href="#">Contact Us</a>
  <a href="#">Links</a>
</nav>
```

Then we add CSS to implement the look and feel as we want to:

```
nav {
  display: flex;
  gap: 0.5rem;
}

a {
  flex: 1;
  background-color: #333;
  color: #fff;
  border: 1px solid;
  padding: 0.5rem;
  text-align: center;
  text-decoration: none;
  transition: all 0.5s ease-out;
}

a:hover,
a:focus {
  background-color: #fff;
  color: #333;
}
```

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Intro - CSS Animations

CSS animations make it possible to animate transitions from one CSS style configuration to another. Animations consist of two components, a style describing the CSS animation and a set of keyframes that indicate the start and end states of the animation's style, as well as possible intermediate waypoints.

There are three key advantages to CSS animations over traditional script-driven animation techniques:

1. They’re easy to use for simple animations; you can create them without even having to know JavaScript.

2. The animations run well, even under moderate system load. Simple animations can often perform poorly in JavaScript. The rendering engine can use frame-skipping and other techniques to keep the performance as smooth as possible.

3. Letting the browser control the animation sequence lets the browser optimize performance and efficiency by, for example, reducing the update frequency of animations running in tabs that aren't currently visible.

Configuring an animation

To create a CSS animation sequence, you style the element you want to animate with the animation property or its sub-properties. This lets you configure the timing, duration, and other details of how the animation sequence should progress. This does not configure the actual appearance of the animation, which is done using the @keyframes at-rule as described in the Defining the animation sequence using keyframes section below.

The sub-properties of the animation property are:

animation-delay

Specifies the delay between an element loading and the start of an animation sequence and whether the animation should start immediately from its beginning or partway through the animation.

animation-direction

Specifies whether an animation's first iteration should be forward or backward and whether subsequent iterations should alternate direction on each run through the sequence or reset to the start point and repeat.

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animation-duration

Specifies the length of time in which an animation completes one cycle.

animation-fill-mode

Specifies how an animation applies styles to its target before and after it runs.

animation-iteration-count

Specifies the number of times an animation should repeat.

animation-name

Specifies the name of the @keyframes at-rule describing an animation's keyframes.

animation-play-state

Specifies whether to pause or play an animation sequence.

animation-timing-function

Specifies how an animation transitions through keyframes by establishing acceleration curves.

Defining animation sequence using keyframes

After you've configured the animation's timing, you need to define the appearance of the animation. This is done by establishing one or more keyframes using the @keyframes at-rule. Each keyframe describes how the animated element should render at a given time during the animation sequence.

Since the timing of the animation is defined in the CSS style that configures the animation, keyframes use a <percentage> to indicate the time during the animation sequence at which they take place. 0% indicates the first moment of the animation sequence, while 100% indicates the final state of the animation. Because these two times are so important, they have special aliases: from and to. Both are optional. If from/0% or to/100% is not specified, the browser starts or finishes the animation using the computed values of all attributes.

You can optionally include additional keyframes that describe intermediate steps between the start and end of the animation.

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Example: Making text slide across the browser window

This simple example styles the <p> element so that the text slides in from off the right edge of the browser window.

Note that animations like this can cause the page to become wider than the browser window. To avoid this problem put the element to be animated in a container, and set overflow: hidden on the container.

HTML

```
<p>
  The Caterpillar and Alice looked at each other for some time in
silence: at
  last the Caterpillar took the hookah out of its mouth, and
addressed her in a
  languid, sleepy voice.
</p>
```

CSS

```
p {
  animation-duration: 3s;
  animation-name: slidein;
}

@keyframes slidein {
  from {
    margin-left: 100%;
    width: 300%;
  }

  to {
    margin-left: 0%;
    width: 100%;
  }
}
```

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Exercise:

Use the techniques we mentioned in the above described sections apply it to your **exercise 10** example.