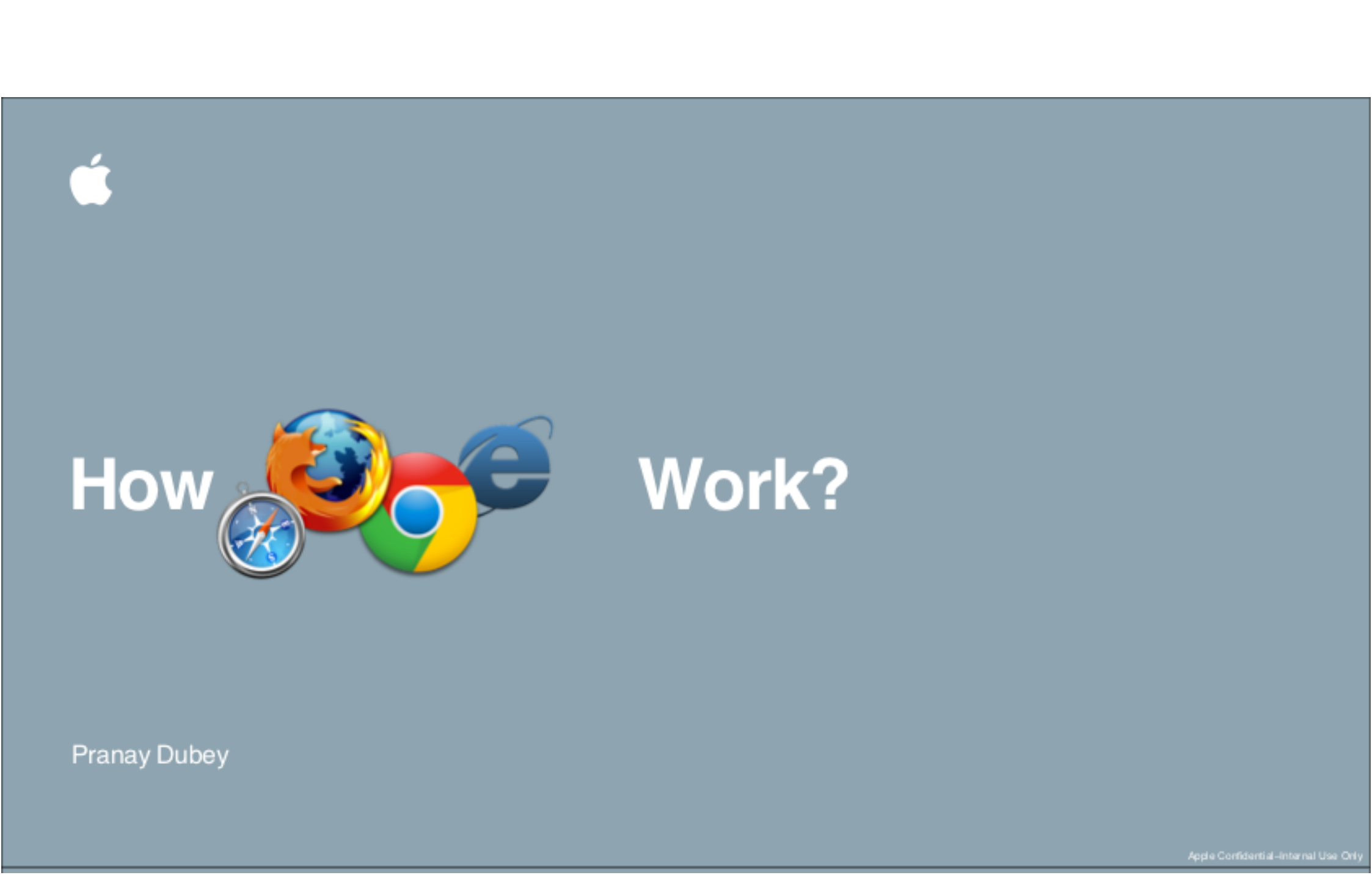
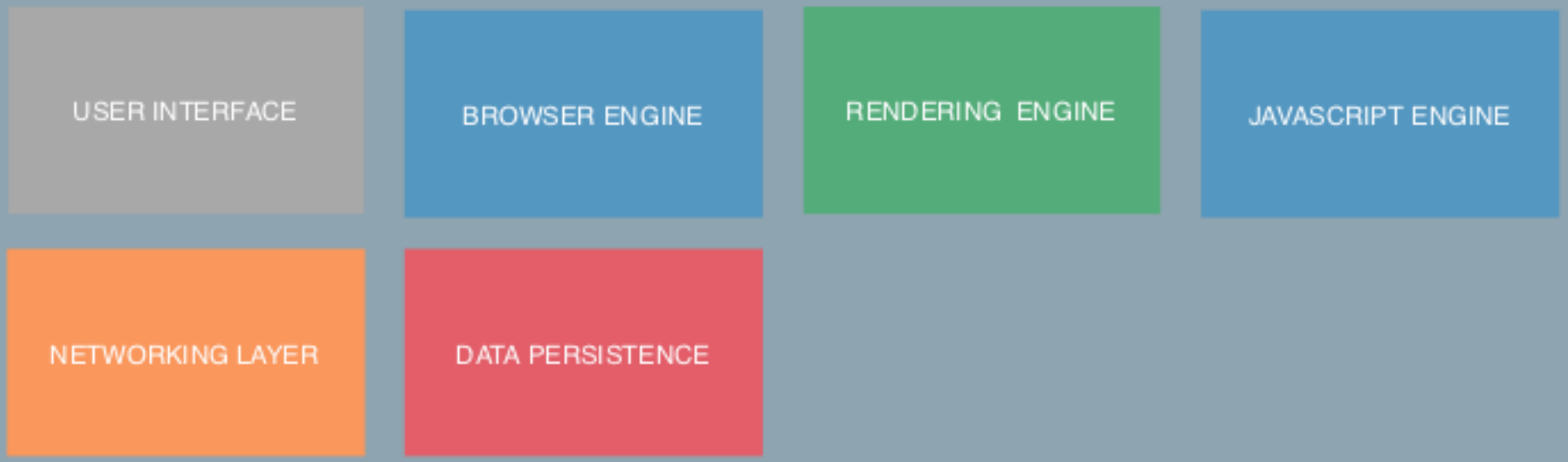
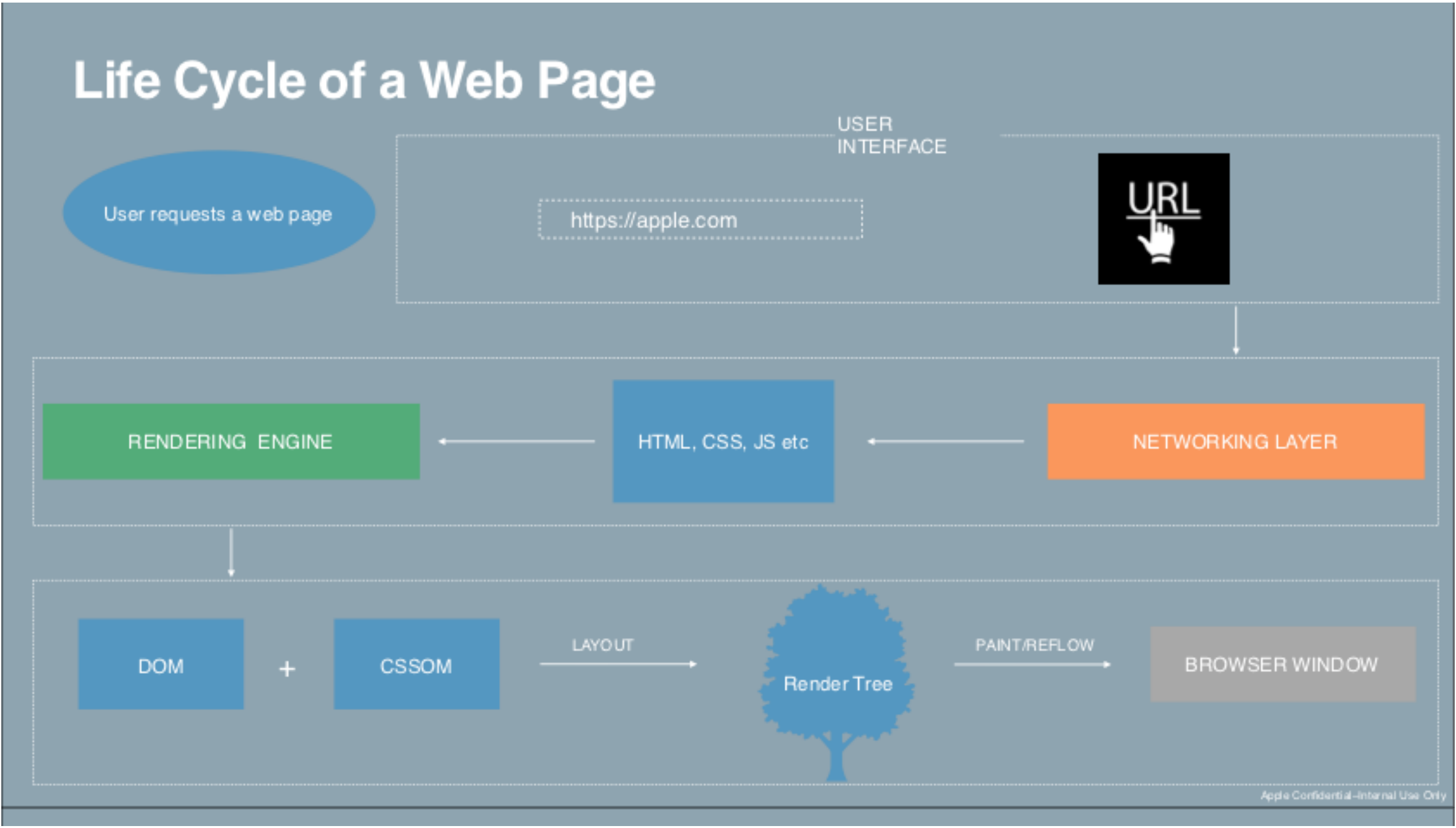

How
Work?
Pranay Dubey
Apple Confidential–Internal Use Only

Building blocks

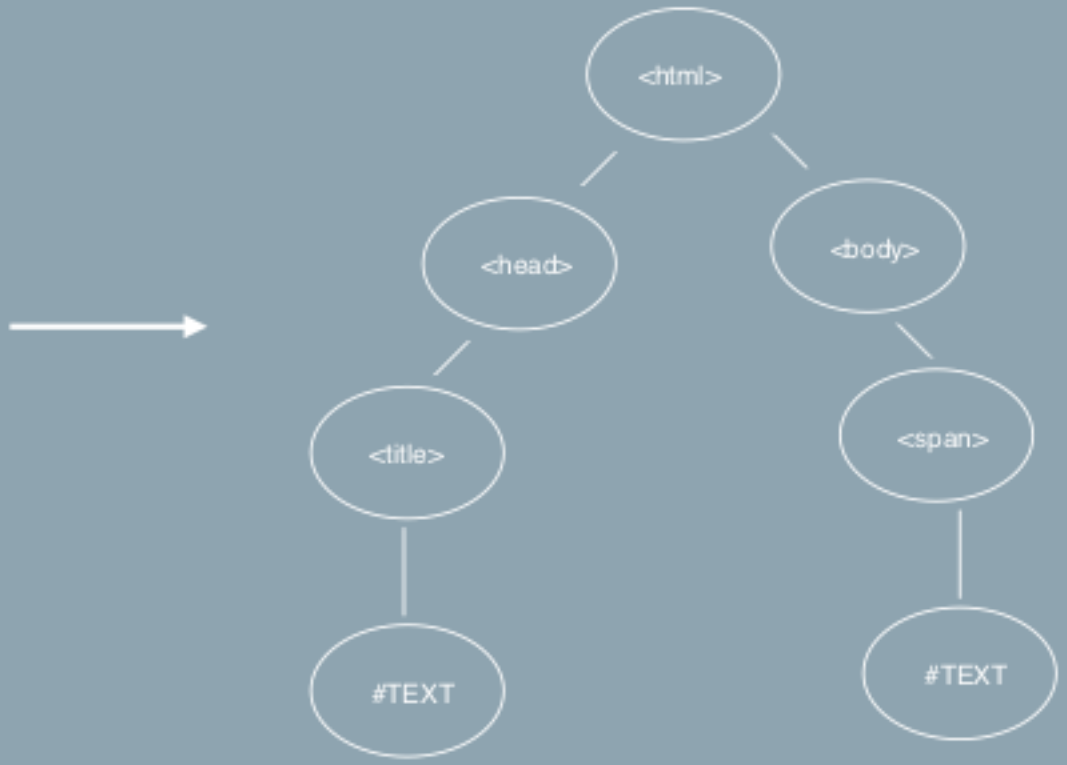


Life Cycle of a Web Page



DOM - Document Object Model

```
<html>
  <head>
    <title>How browsers work?</title>
  </head>
  <body>
    <span>Hello World!</span>
  </body>
</html>
```

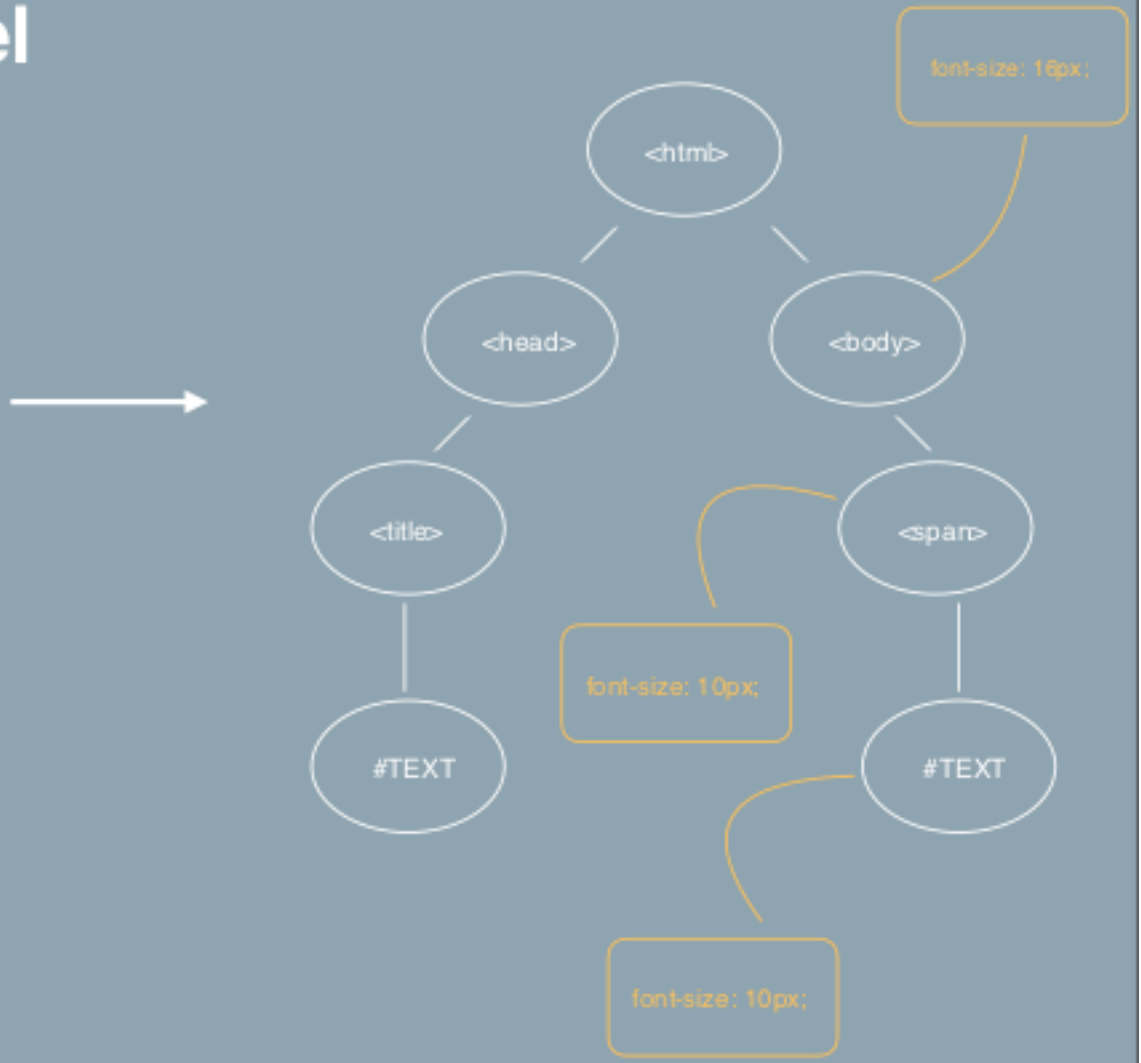


CSSOM - CSS Object Model

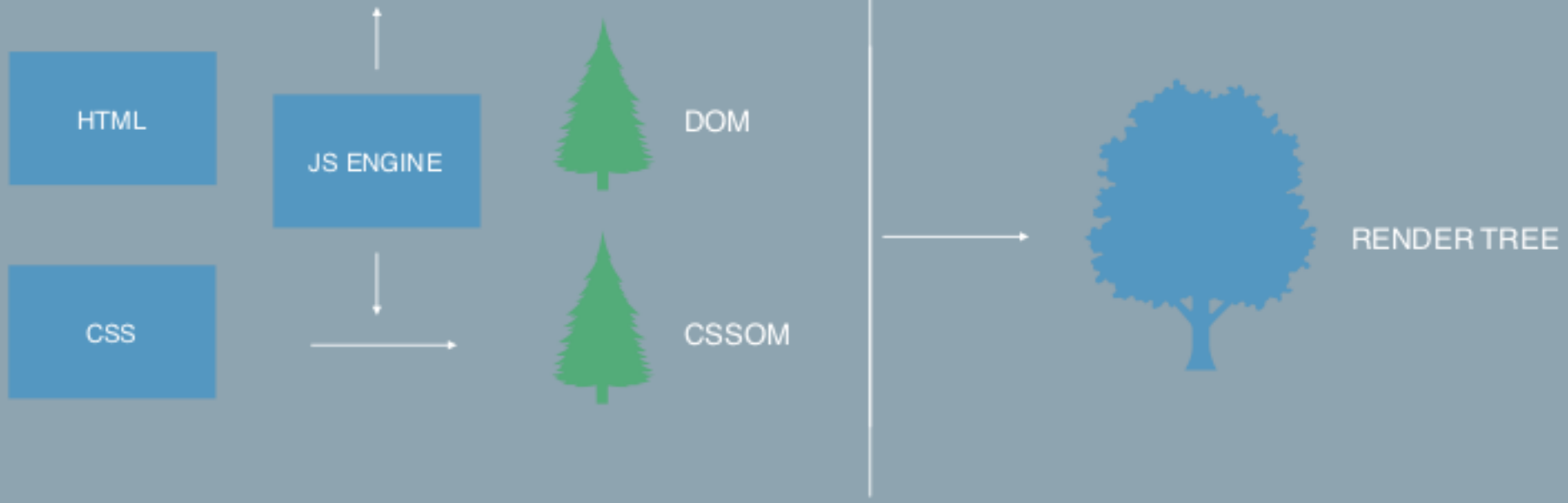
```
body {
    font-size: 16px;
}

span {
    font-size: 10px;
}

div {
    display: none;
}
```



DOM + CSSOM = Render Tree



JavaScript Engine

- Single Threaded
- Acts as a layer between Rendering Engine and Network layer via WebApis
- Can access/manipulate DOM/CSSOM directly via WebApis
- Maintains a Call Stack to execute functions

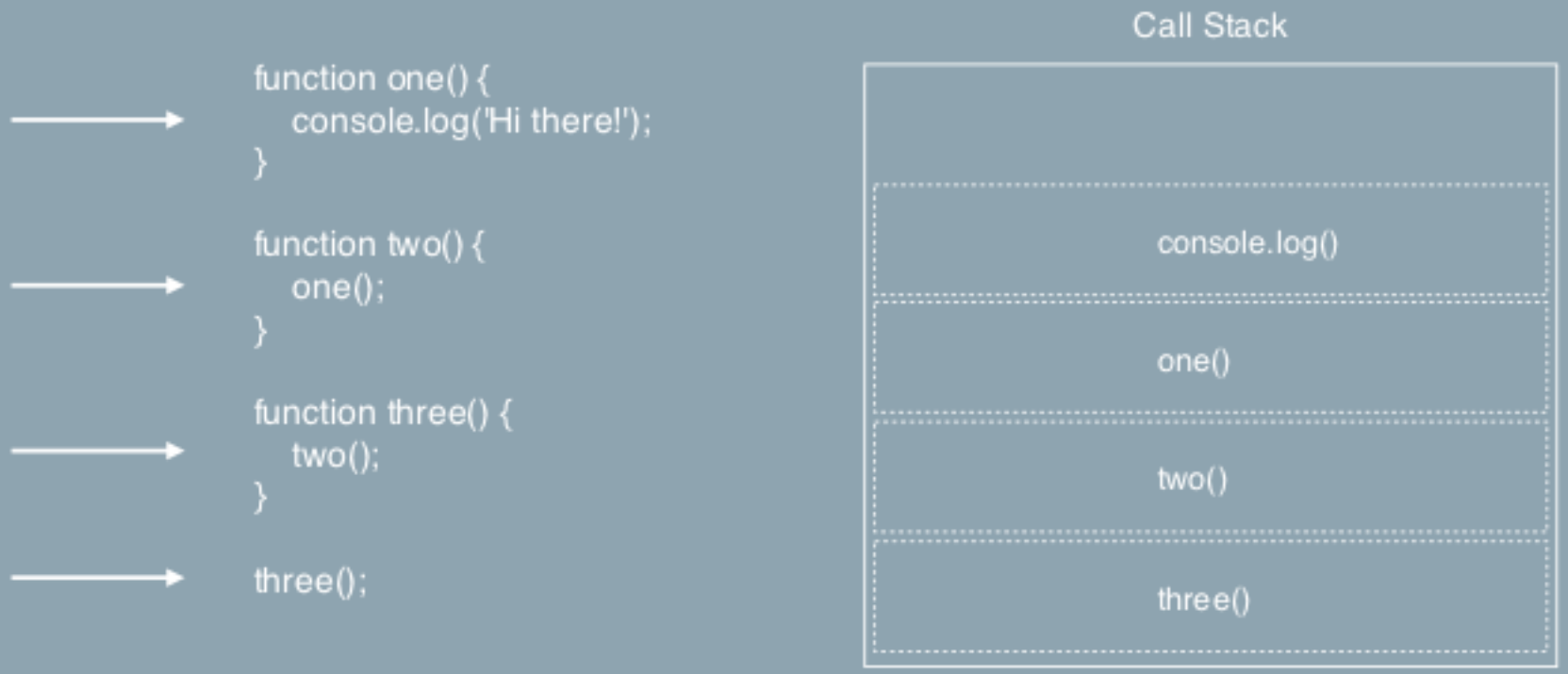
JS Call Stack

```
function one() {
    console.log('Hi there!');
}

function two() {
    one();
}

function three() {
    two();
}

three();
```



How do we achieve Parallelism?

```
function one() {
    console.log('Hi there!');
}

function two() {
    one();
}

function three() {
    two();
}

$.getData(); // 5 secs to load
three();
```

Call Stack

WebAPIs to the rescue!

- Allows code to be pushed into queue for later execution
- Helps in faster UI rendering (unblocks call stack)
- setTimeout, setInterval, XMLHttpRequest…
- Uses Event Loop to manage callbacks

Event loop

- Queue to manage WebApis callbacks
- Constantly running to see if Call Stack is empty.

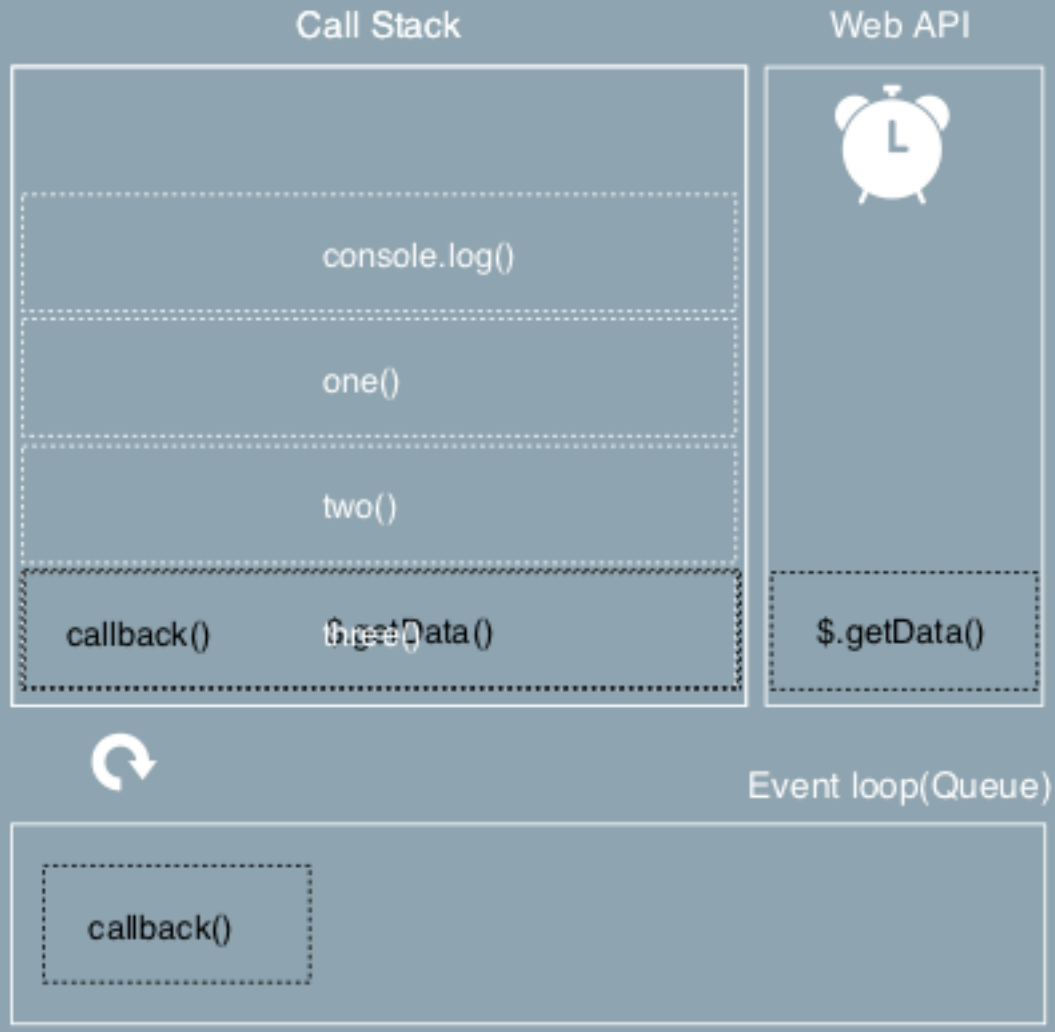
How do we achieve Parallelism?

```
function one() {
    console.log('Hi there!');
}

function two() {
    one();
}

function three() {
    two();
}

$.getData(); // 5 secs to load
three();
```



DEM

What if the callbacks are

Web Workers to the rescue!

Web Workers to the rescue!

- A JavaScript code running in the background, a dedicated JS engine instance minus WebApis. (no access to DOM/CSSOM)
- Does not affects the performance of the page.
- Efficient for heavy calculations that would otherwise block the JS Call stack
- Examples - mathematical operations (factorial, PI), Games (physics engine)

DEM

while (i < 2500000000) { i += 1}

Quiz

Quiz

Which of the following will NOT be rendered in the browser?

1

```
<html>
 <head></head>
 <body>
  <span>
   Hello World!
  </span>
 </body>
</html>
```

2

```
<html>
</html>
```

3

```
Hello  World!
```

4

```
<span>
  Hello World!
</span>
```

5

```
<html>
 <head></head>
 <body>
  <span>
  </span>
 </body>
   Hello World!
</html>
```

6

```
<- -  Hello World! - - >
```

7

```
<html>
 <head></head>
 <body>
  <span>
 </span>
 </body>
</html>
   Hello World!
```

Answer: Everything

Why do we minify html files?

```
<html>
  <head></head>
  <body>
    <span>
      Hello World!
    </span>
  </body>
</html>
```

```
<html><head></
head><body><span>Hell
o World!</span></
body></html>
```

Answer:

New lines/ extra spaces adds text node in