

O'REILLY®

Velocity

CONFERENCE

BUILD RESILIENT SYSTEMS AT SCALE

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#velocityconf

Performance challenges with experimentation 实验带来的性能挑战



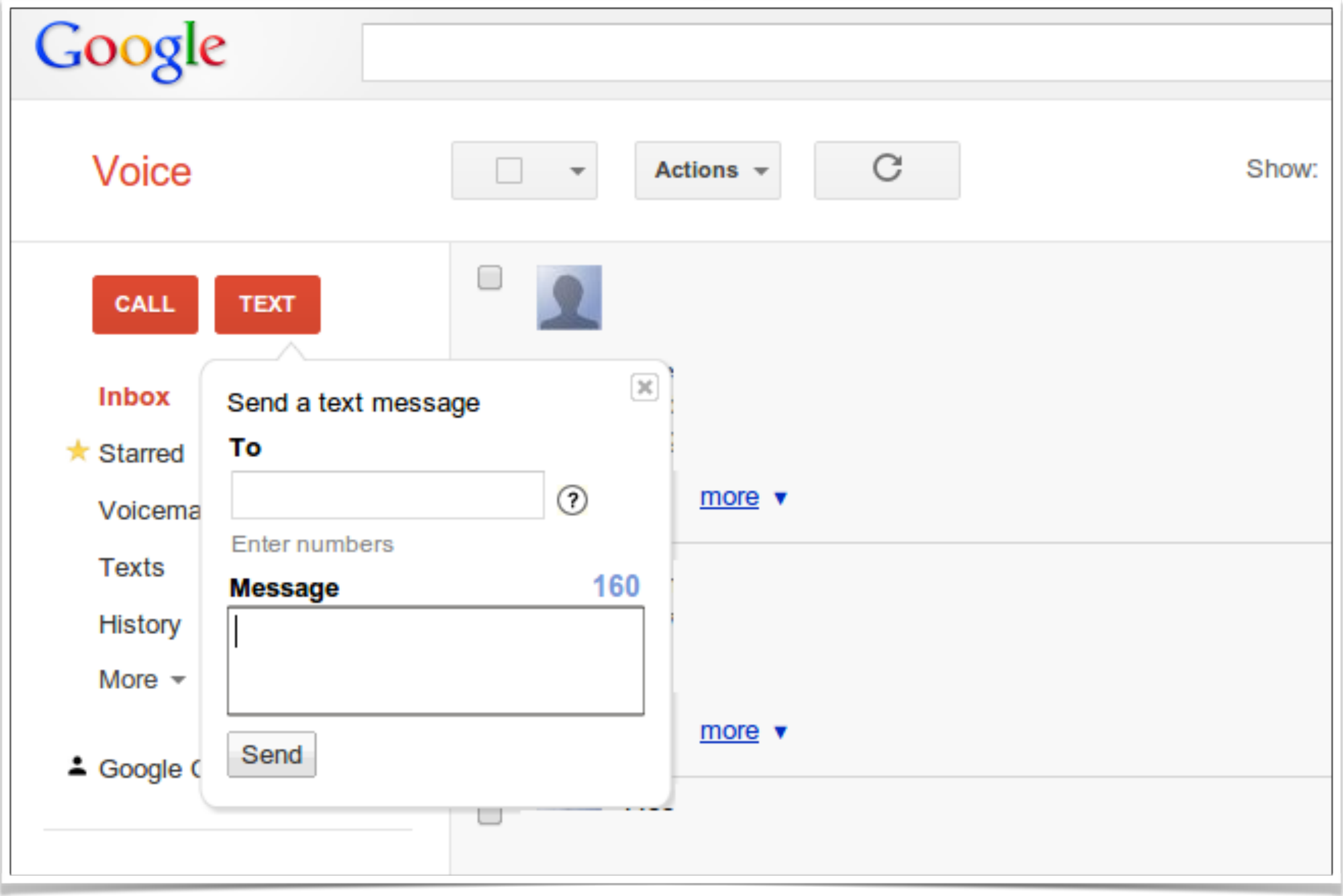
Alva Cheung



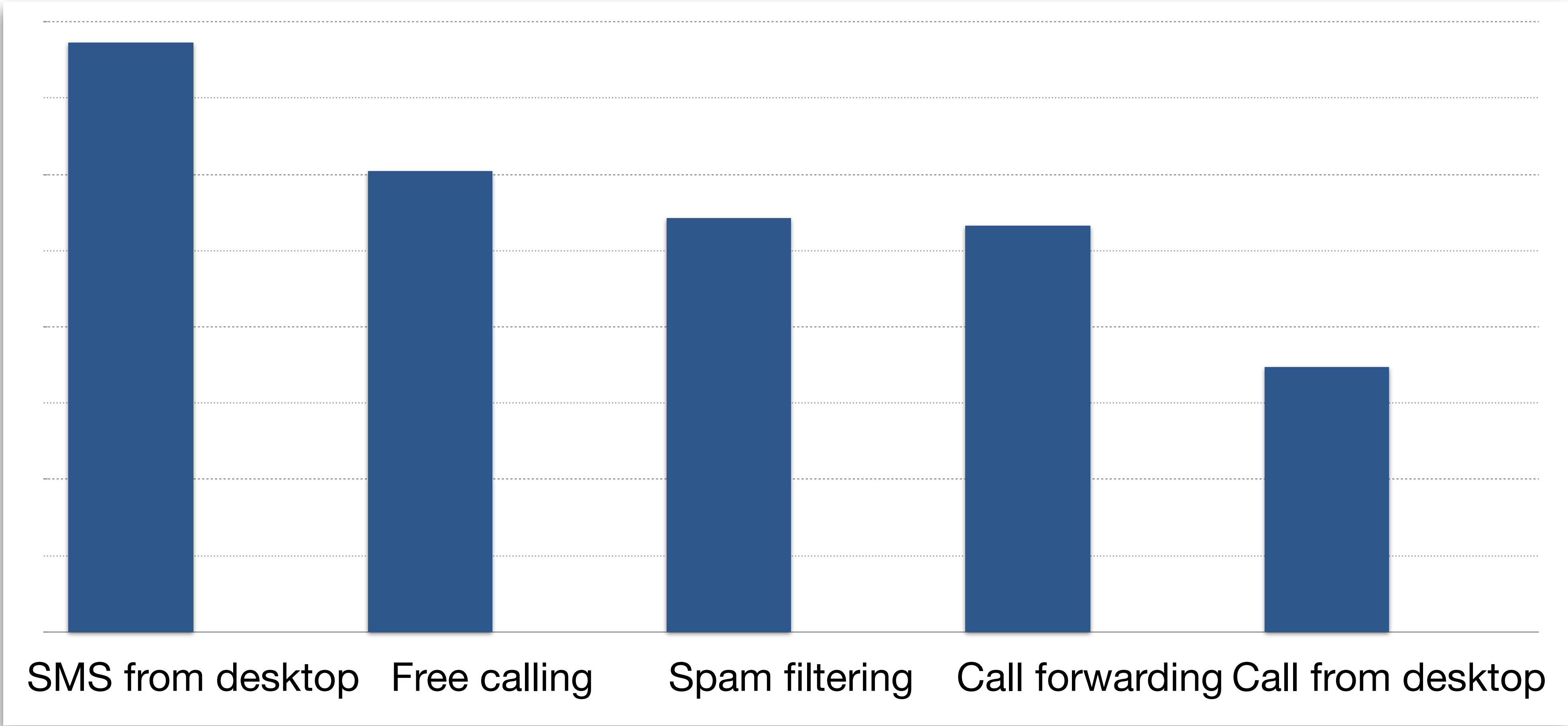
You are not your target audience



You are not your target audience



You are not your target audience



Subtle difference, big impact



<http://mashable.com/2015/06/16/spotify-color-change/>

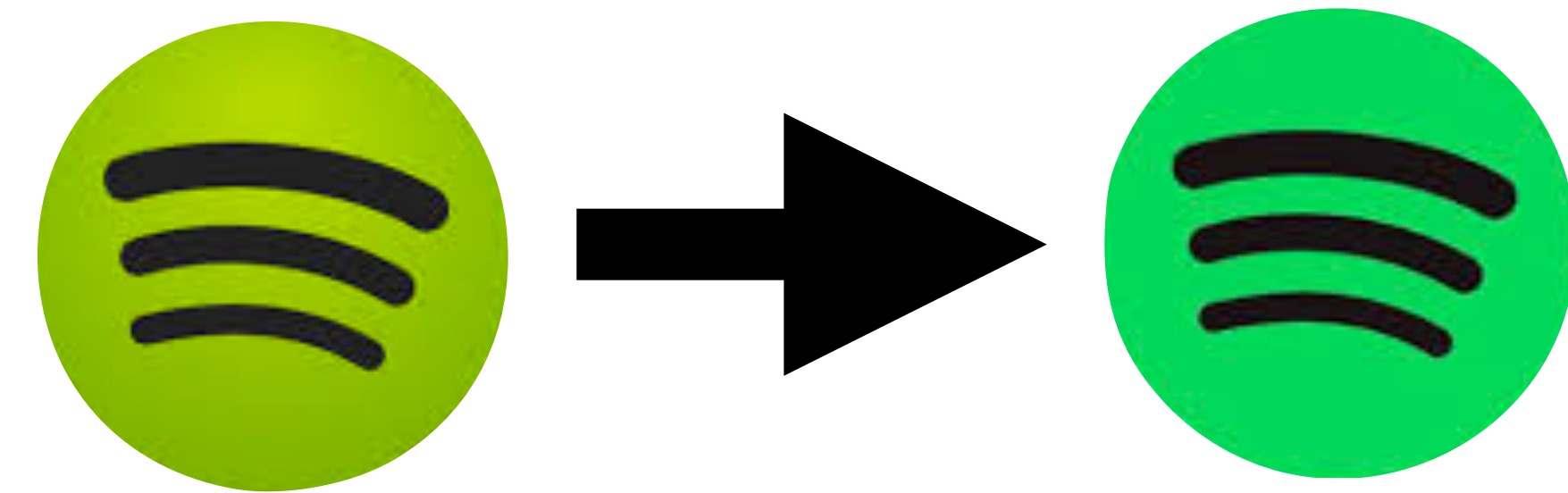
Subtle difference, big impact



<http://mashable.com/2015/06/16/spotify-color-change/>

Subtle difference, big impact

Spotify®



i'm considering deleting the spotify app simply because the new shade of green is making me feel extremely uncomfortable and on edge

— charl (@arcticharl) [June 16, 2015](#)

The spotify update has ugliest and most unnecessary shade of green I thought I was seeing colors wrong when I woke up

pic.twitter.com/Wmh9Xvg01q

— Lonk (@c0mic_sans) [June 15, 2015](#)

<http://mashable.com/2015/06/16/spotify-color-change/>

Subtle difference, big impact

“

What sounds like a small change ended up in a relatively huge tweet storm with thousands of people sharing their hate...

<http://www.vanschneider.com/>

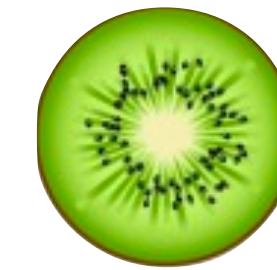
Experimentation is easy!



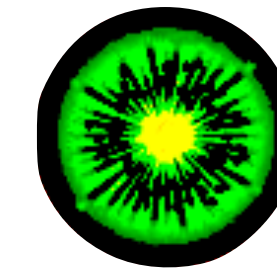
Serving experiments



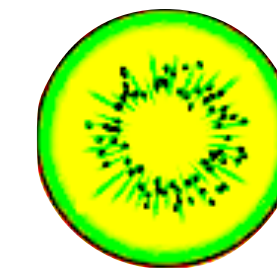
Experiment 1



60%
base/control

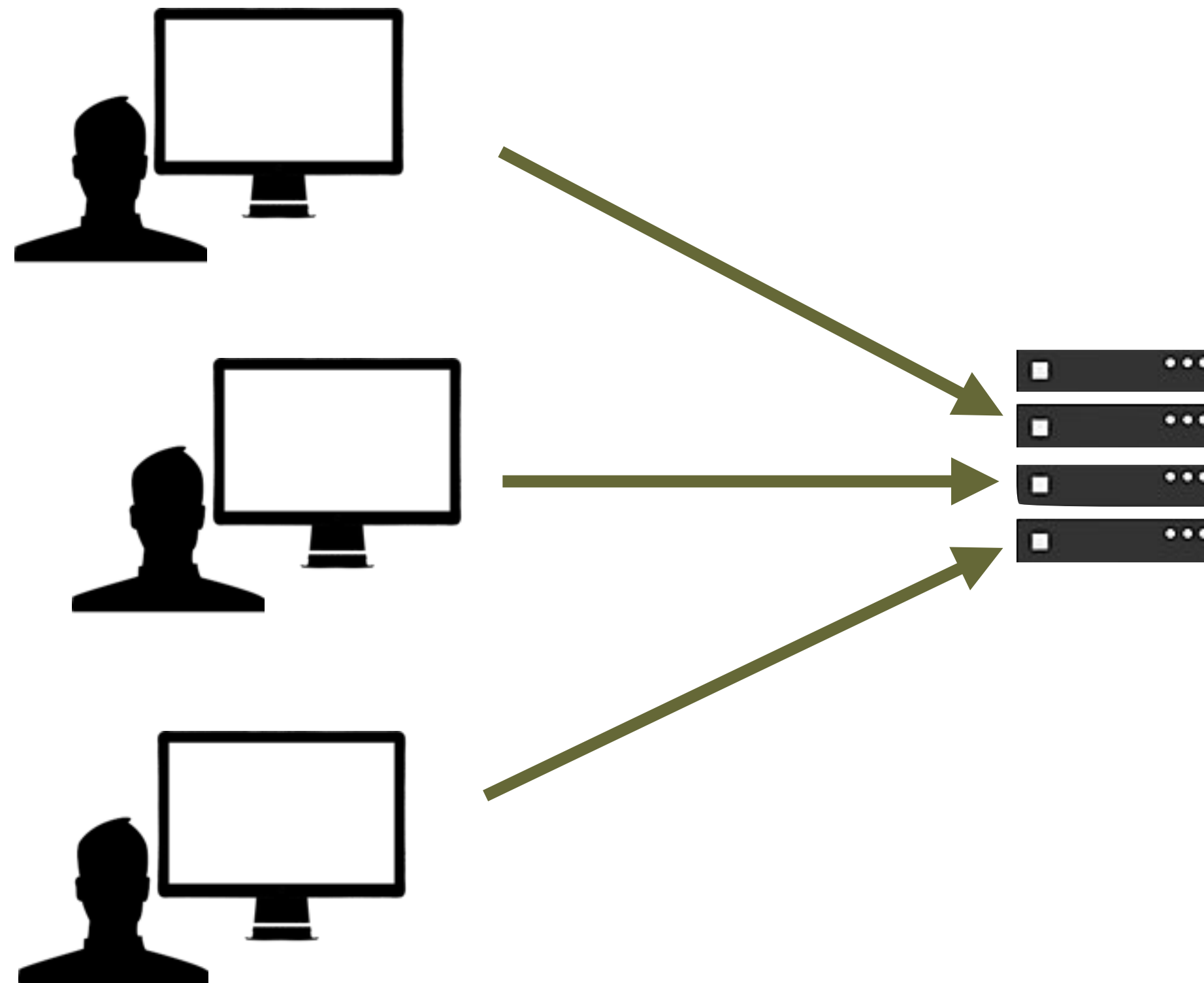


20%
variation1

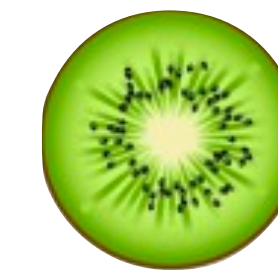


20%
variation2

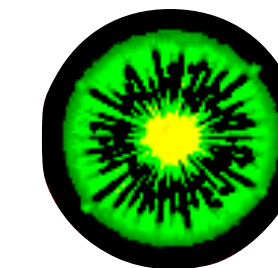
Serving experiments



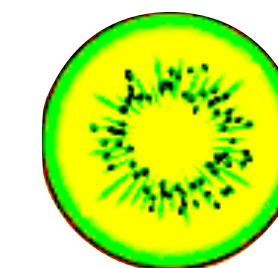
Experiment 1



60%
base/control

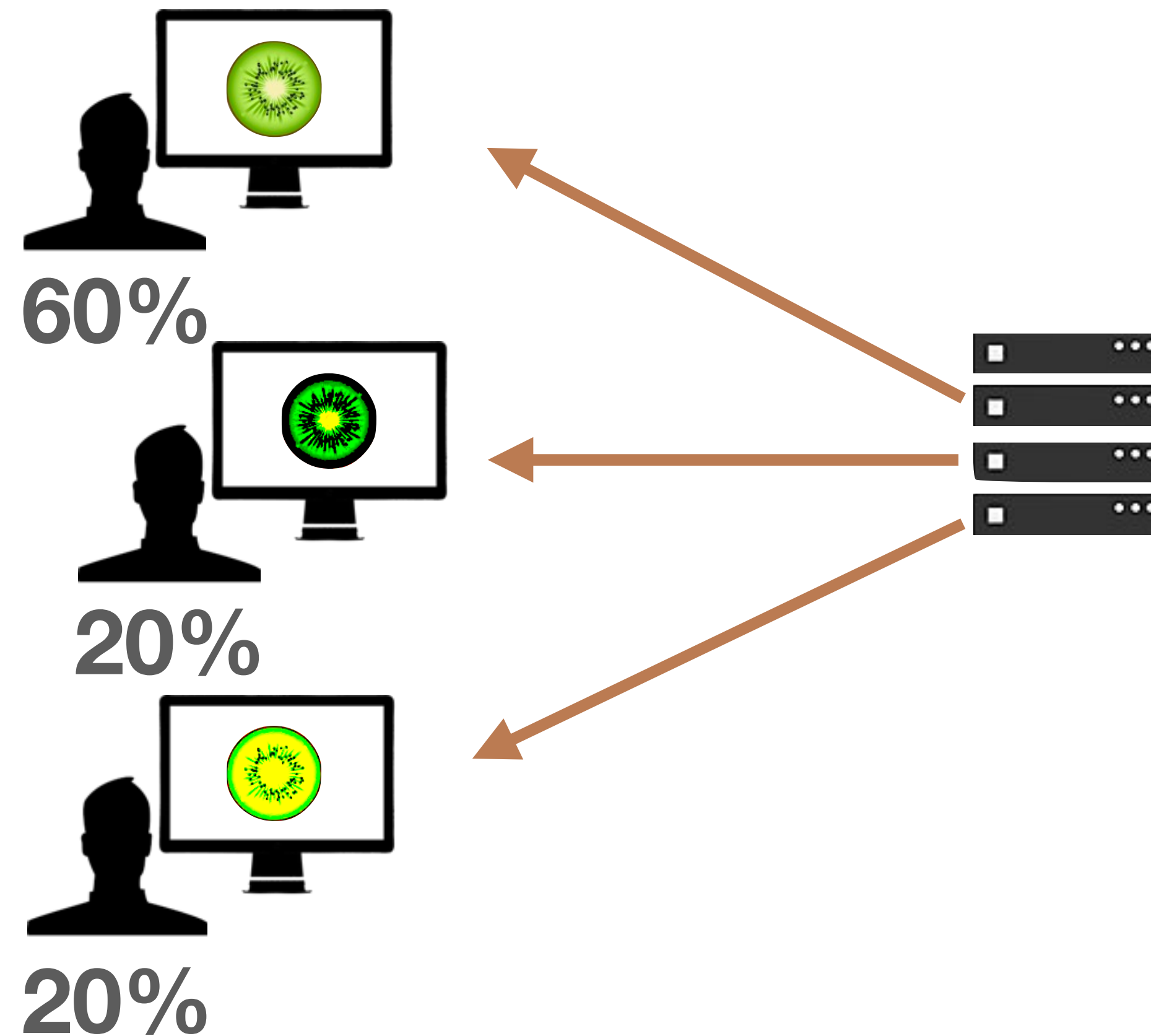


20%
variation1



20%
variation2

Serving experiments



Experiment 1

 **60%**
base/control

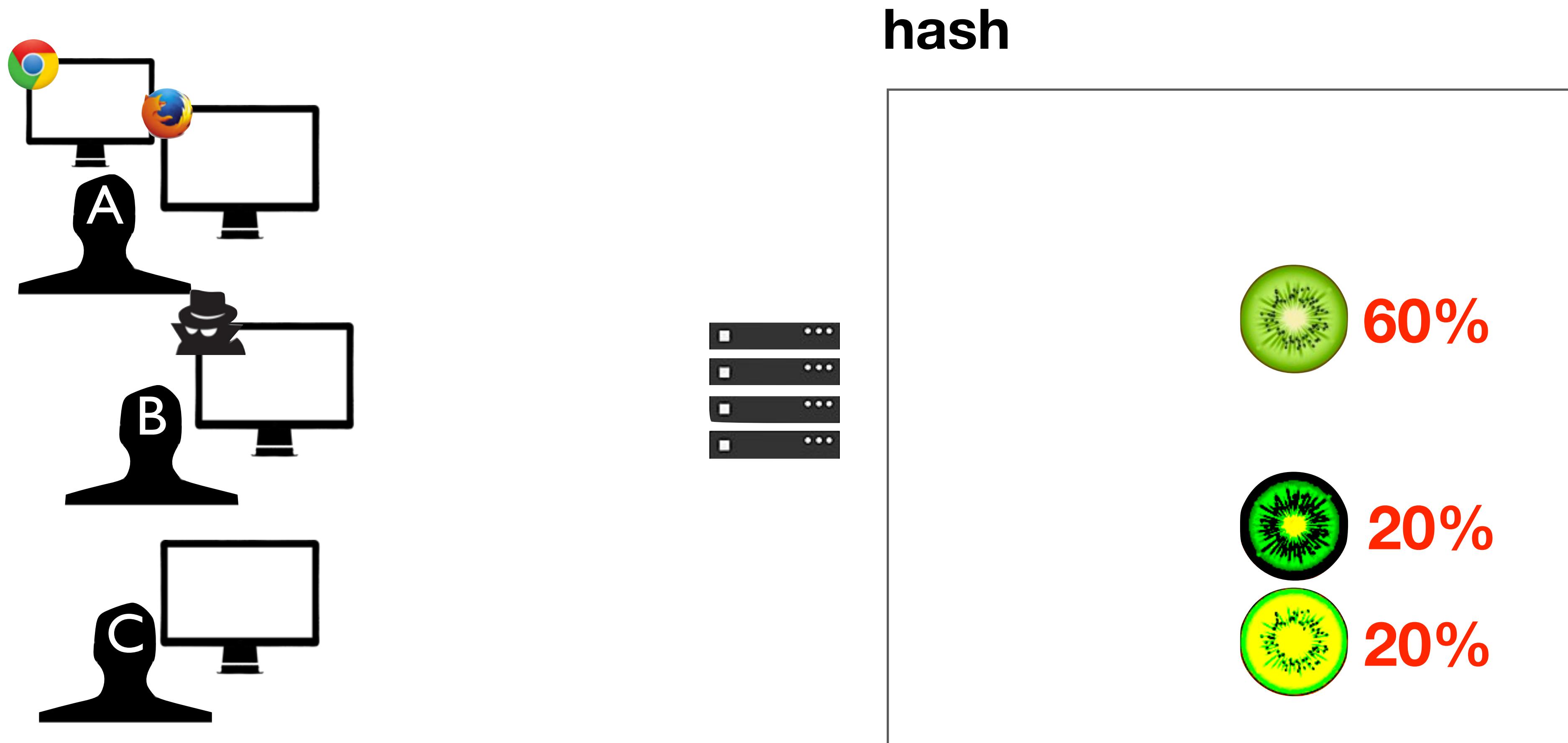
 **20%**
variation1

 **20%**
variation2

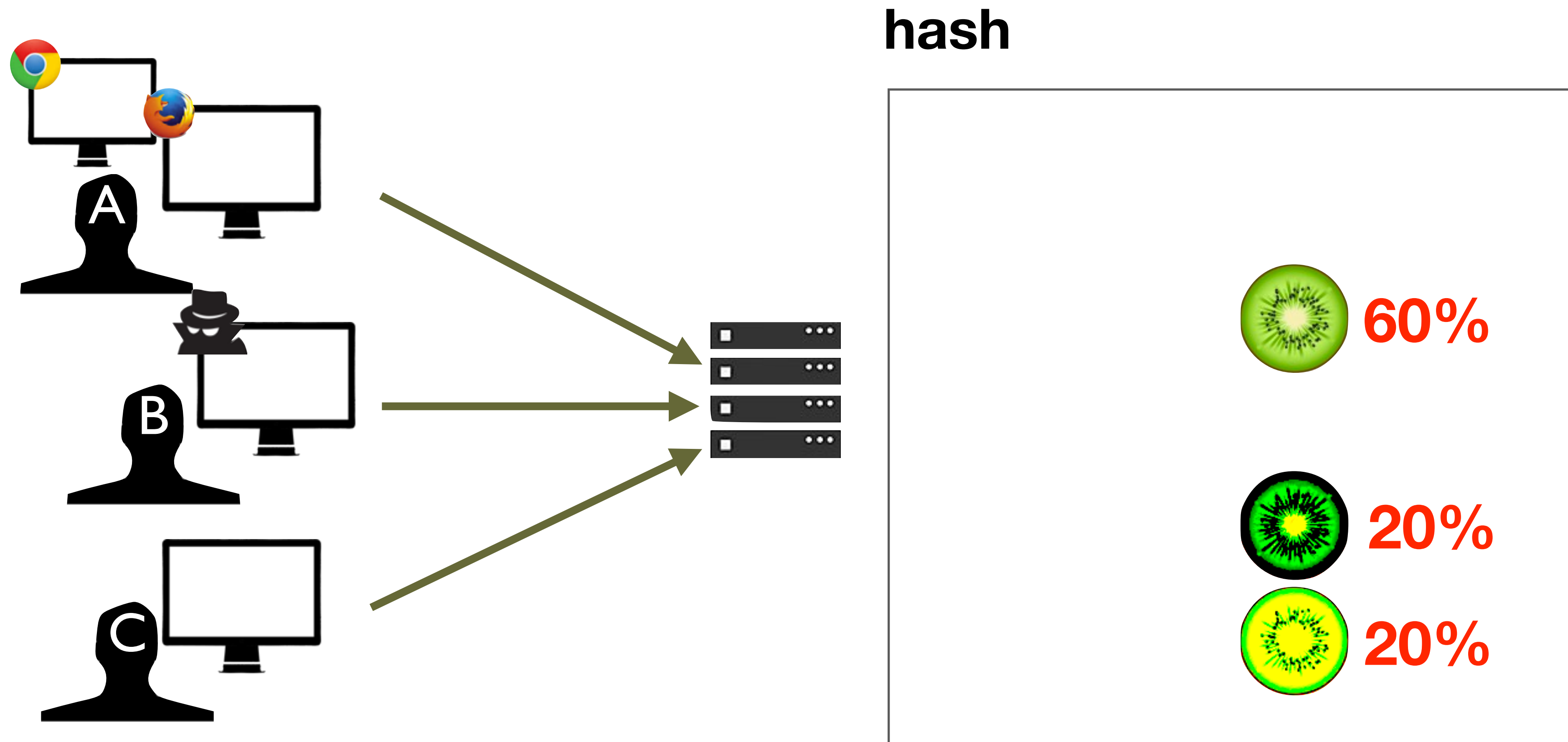
Experimentation is easy.....?



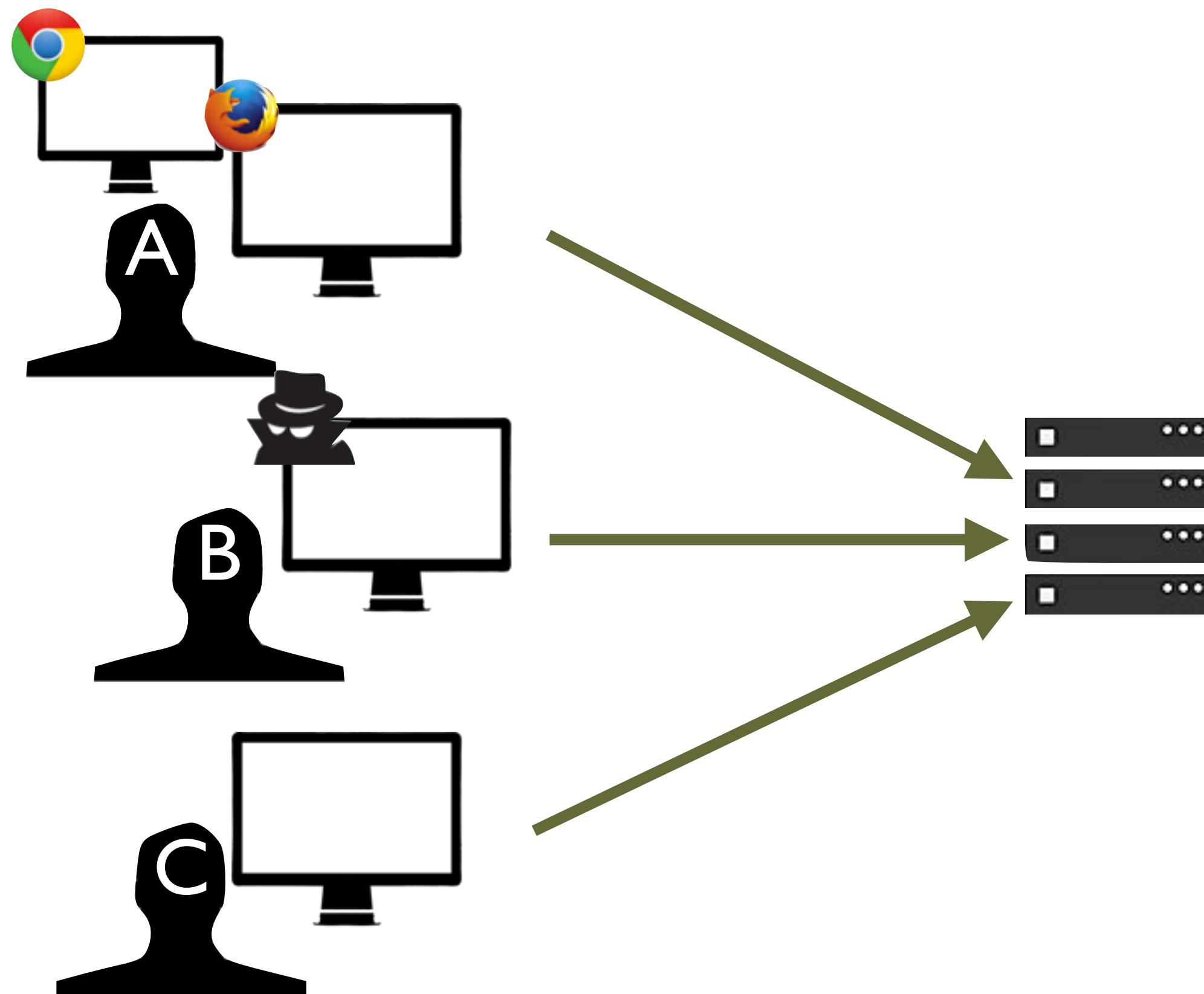
Serving experiments with consistencies



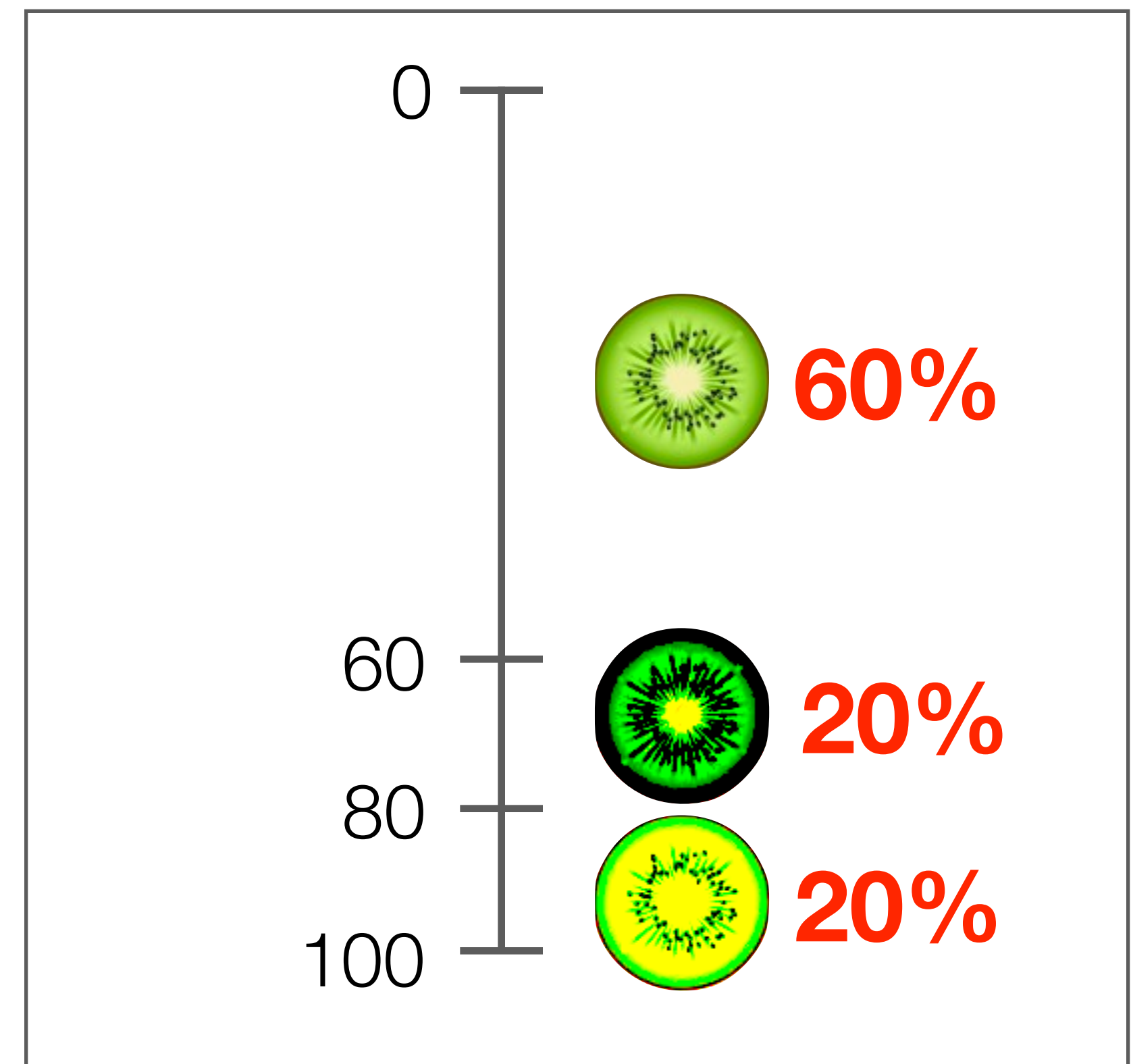
Serving experiments with consistencies



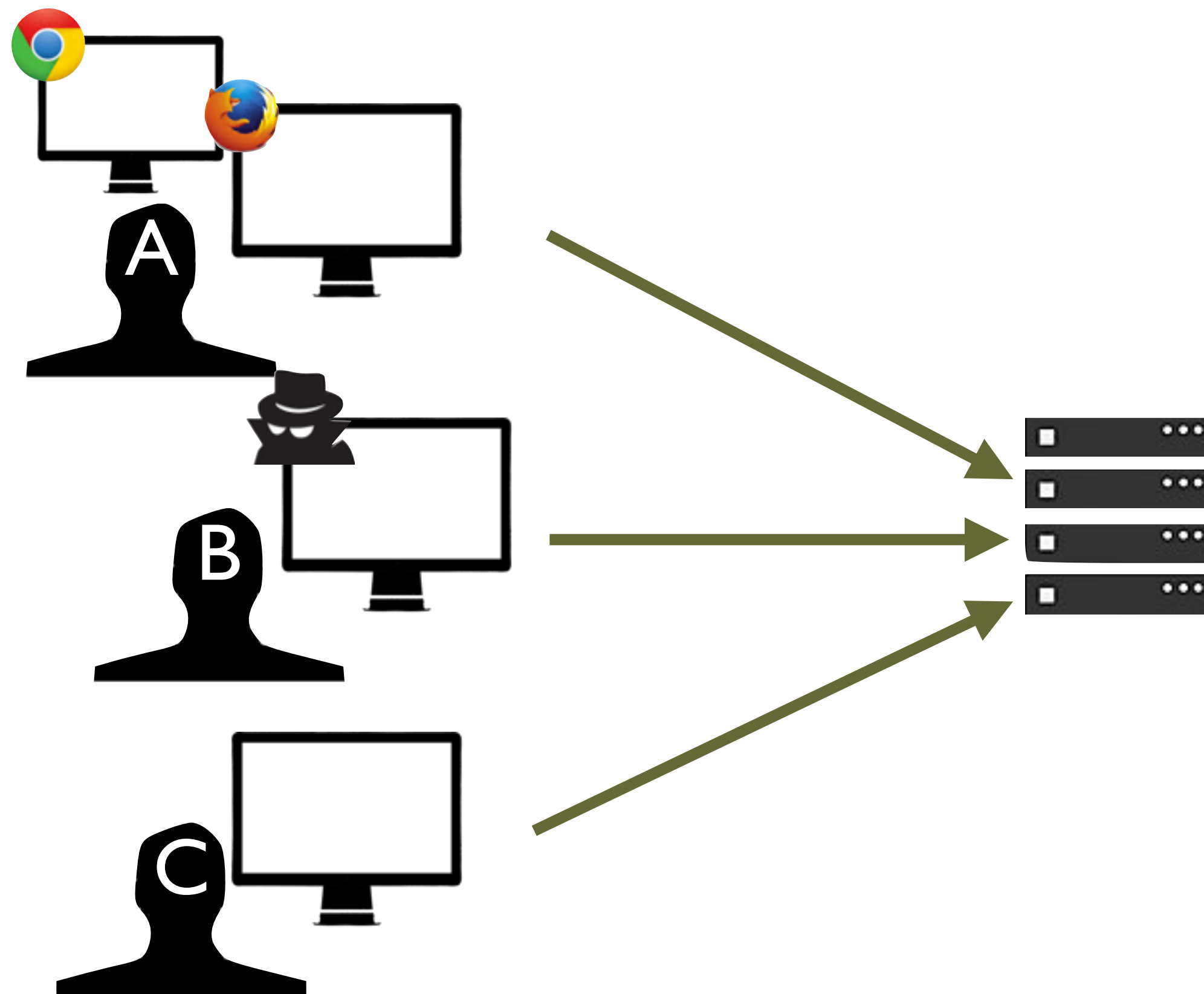
Serving experiments with consistencies



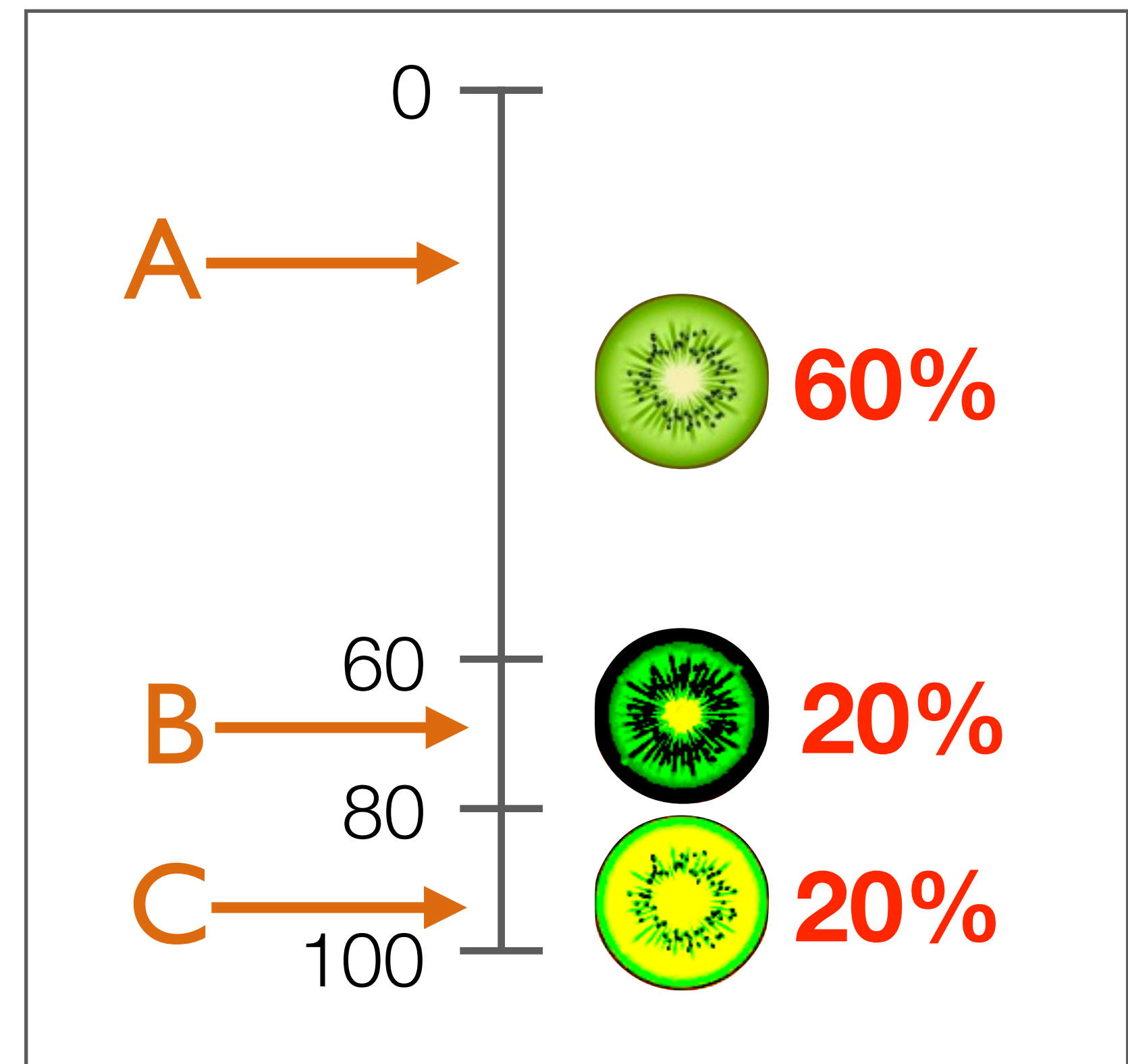
hash



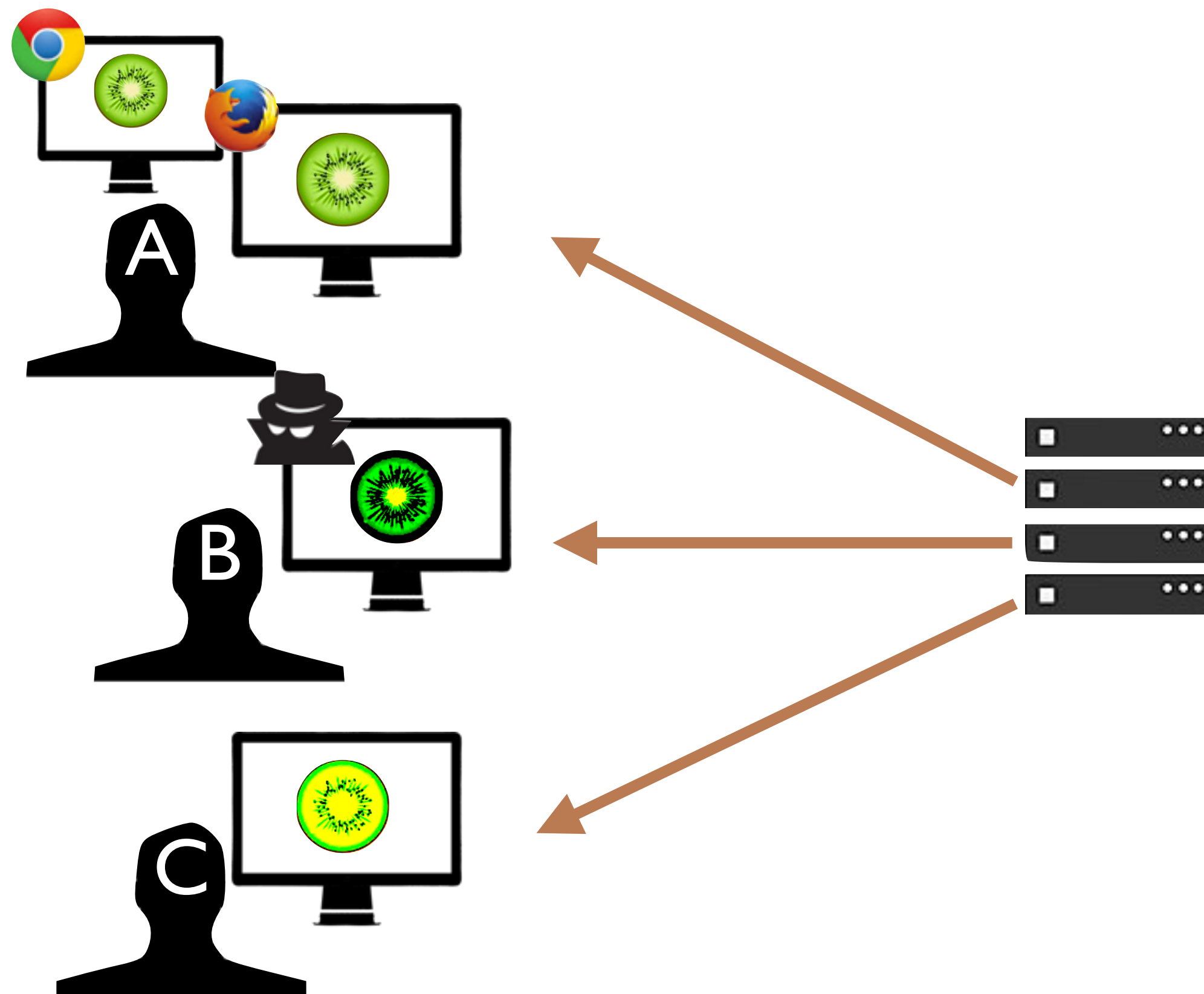
Serving experiments with consistencies



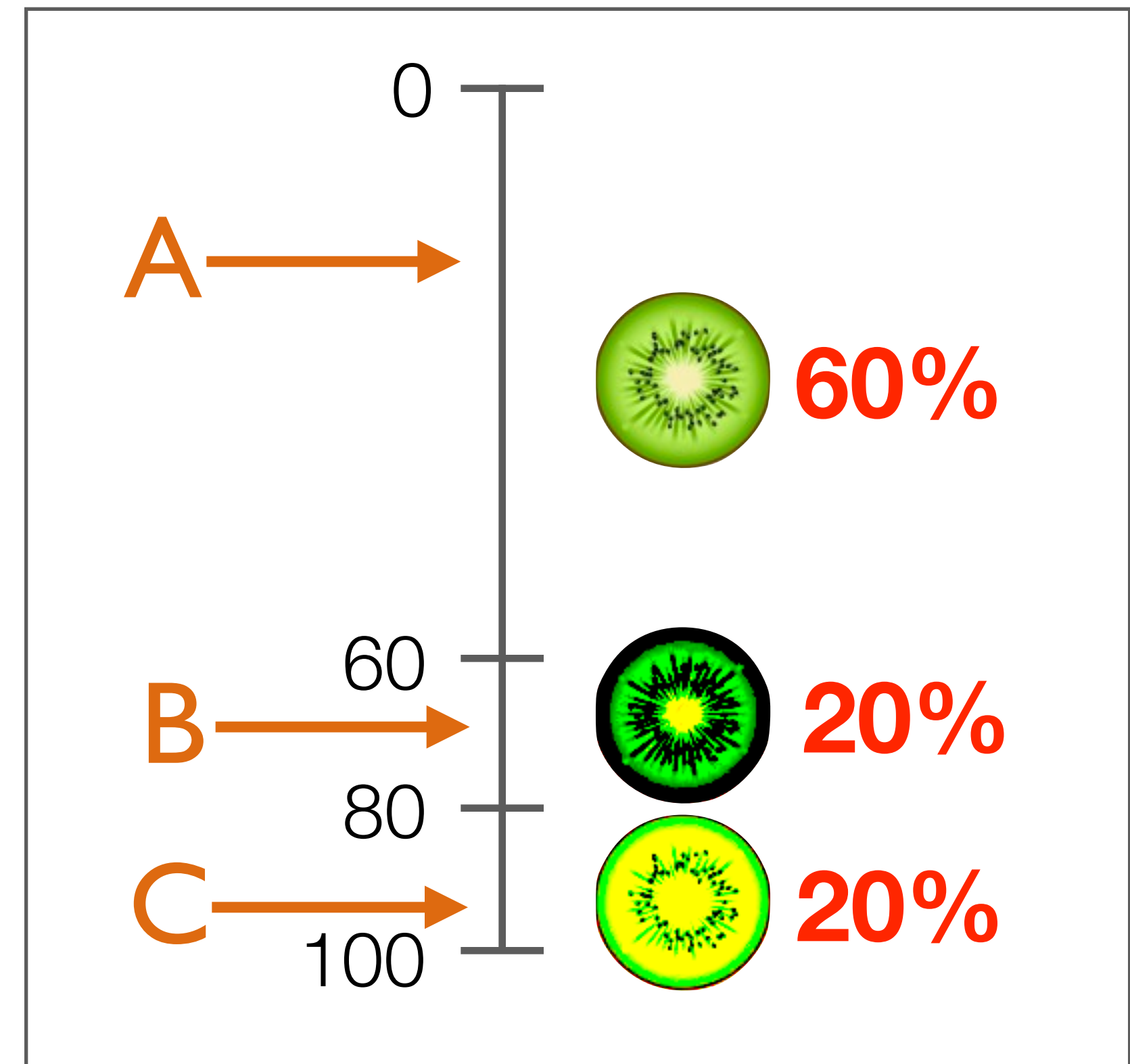
hash



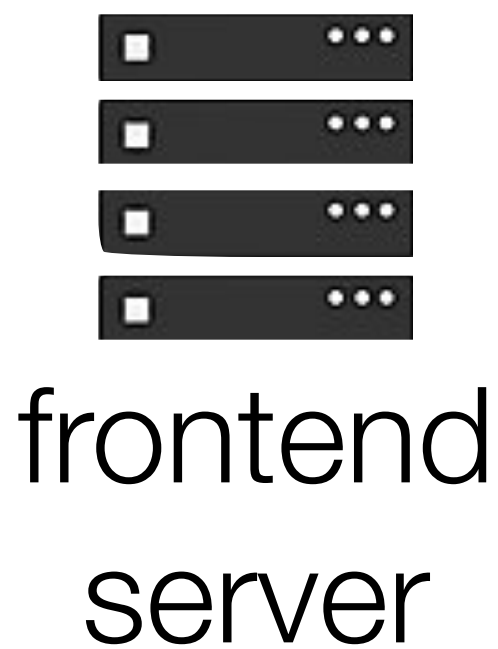
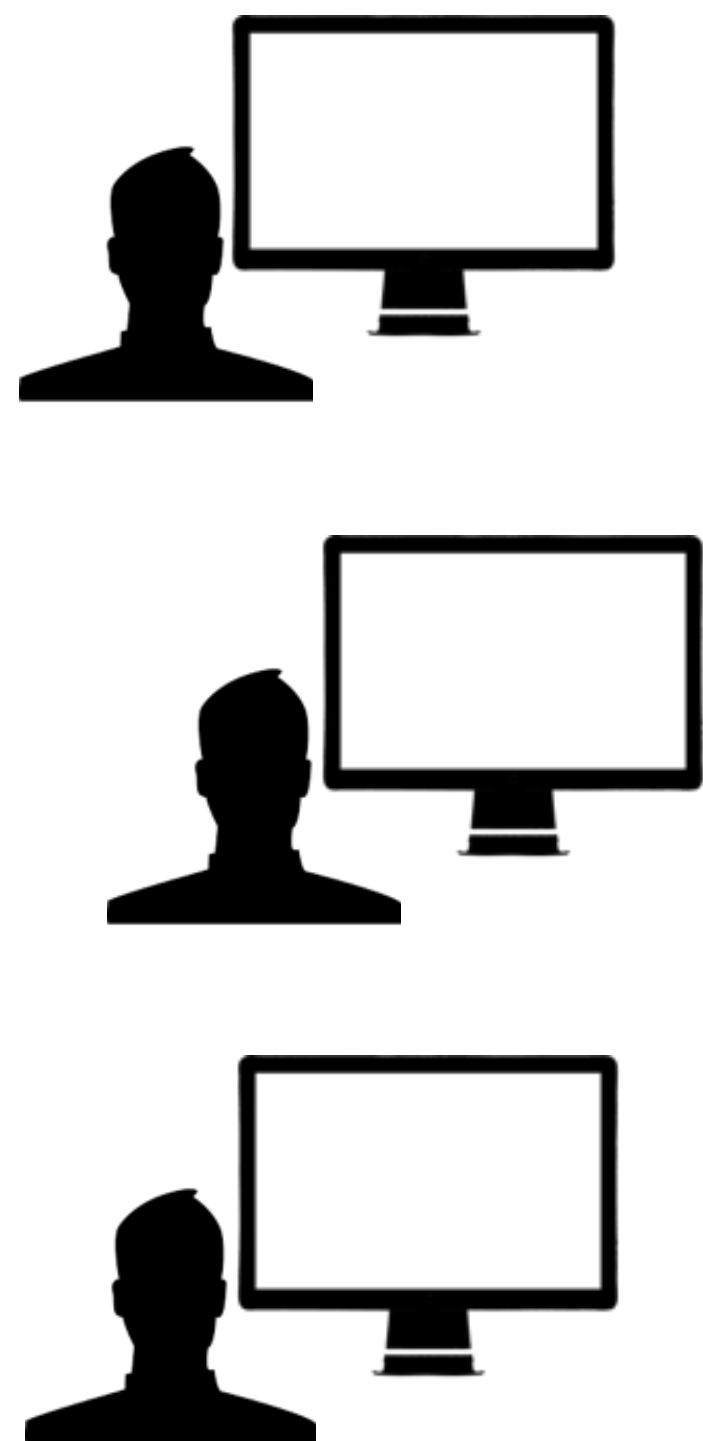
Serving experiments with consistencies



hash



Serving many experiments

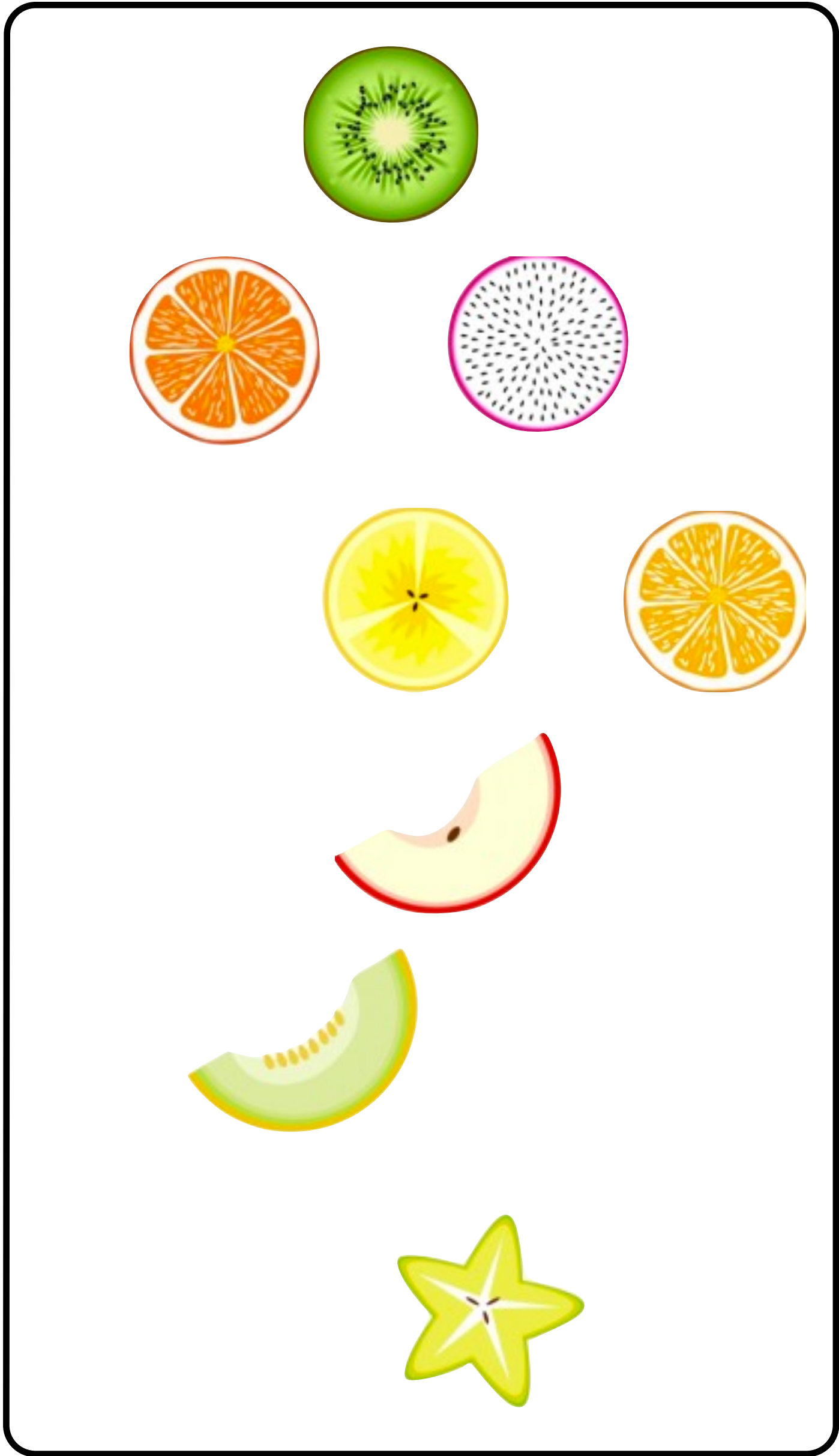


frontend
server

experimentation
library



experimentation
server



Serving many experiments

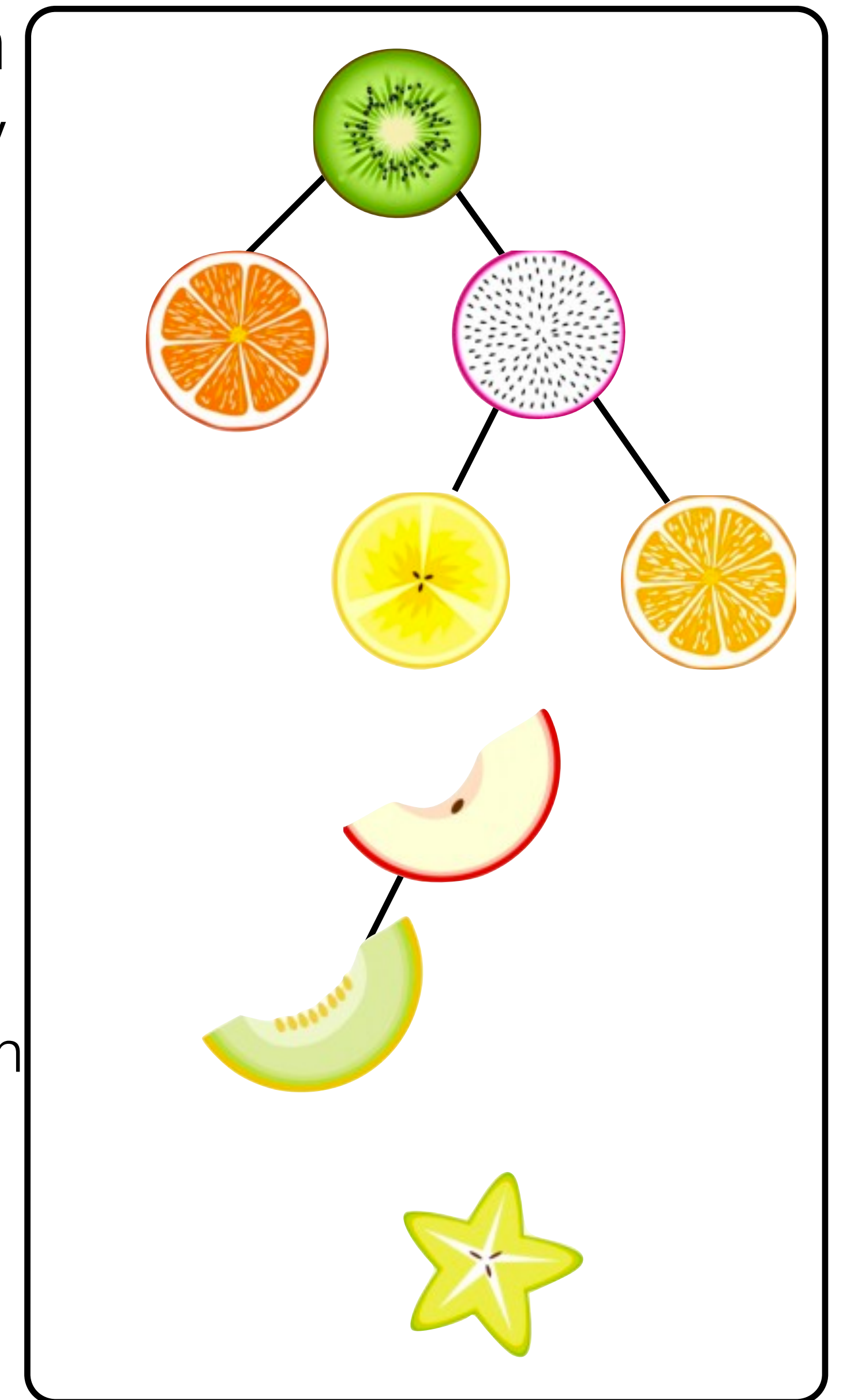


frontend
server

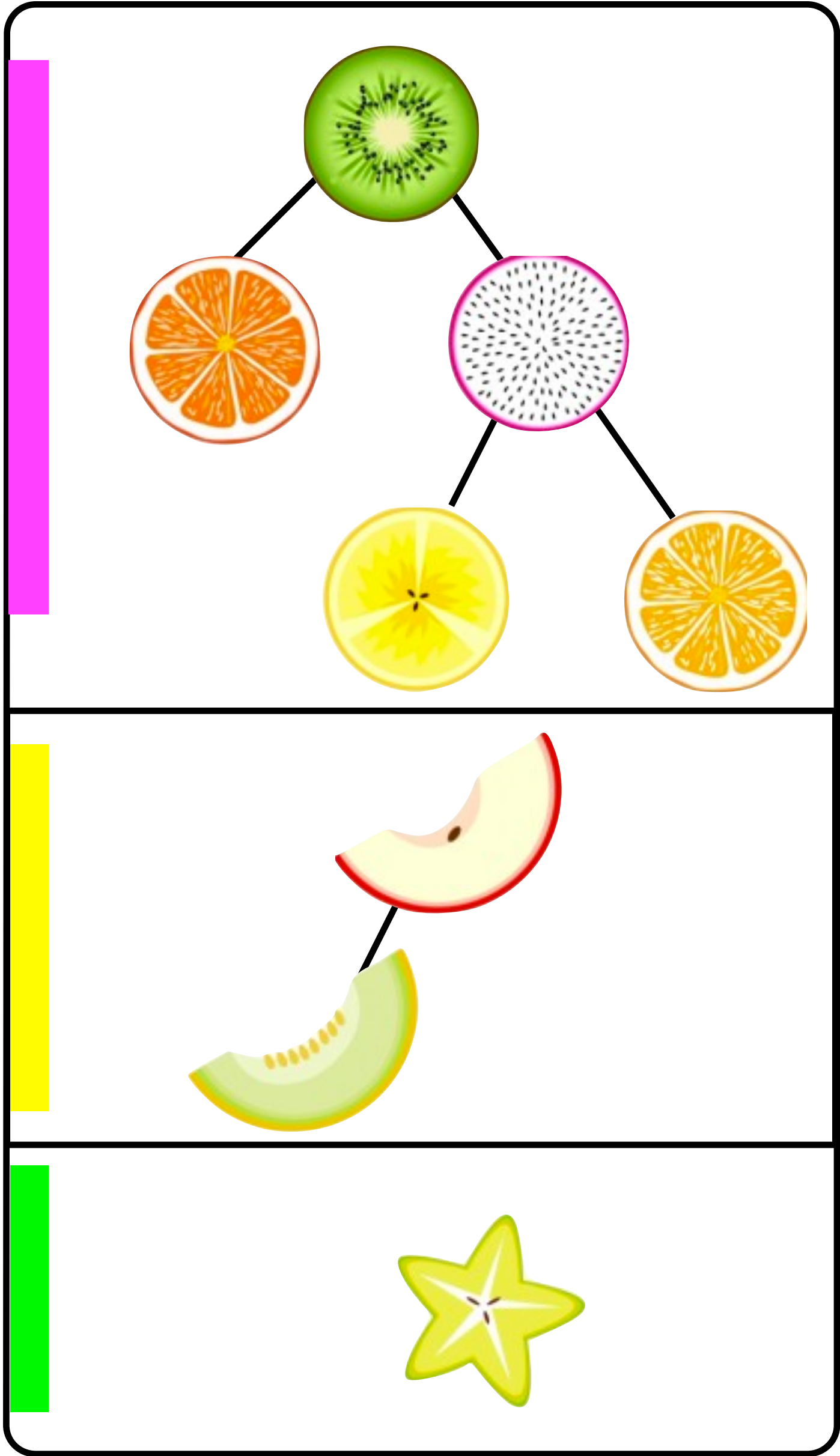
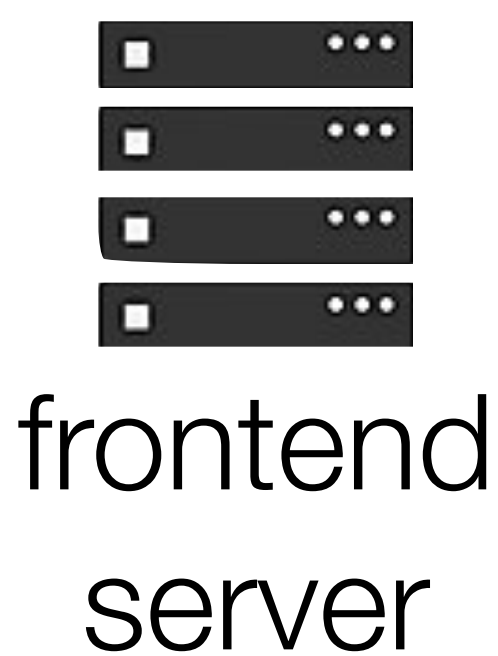
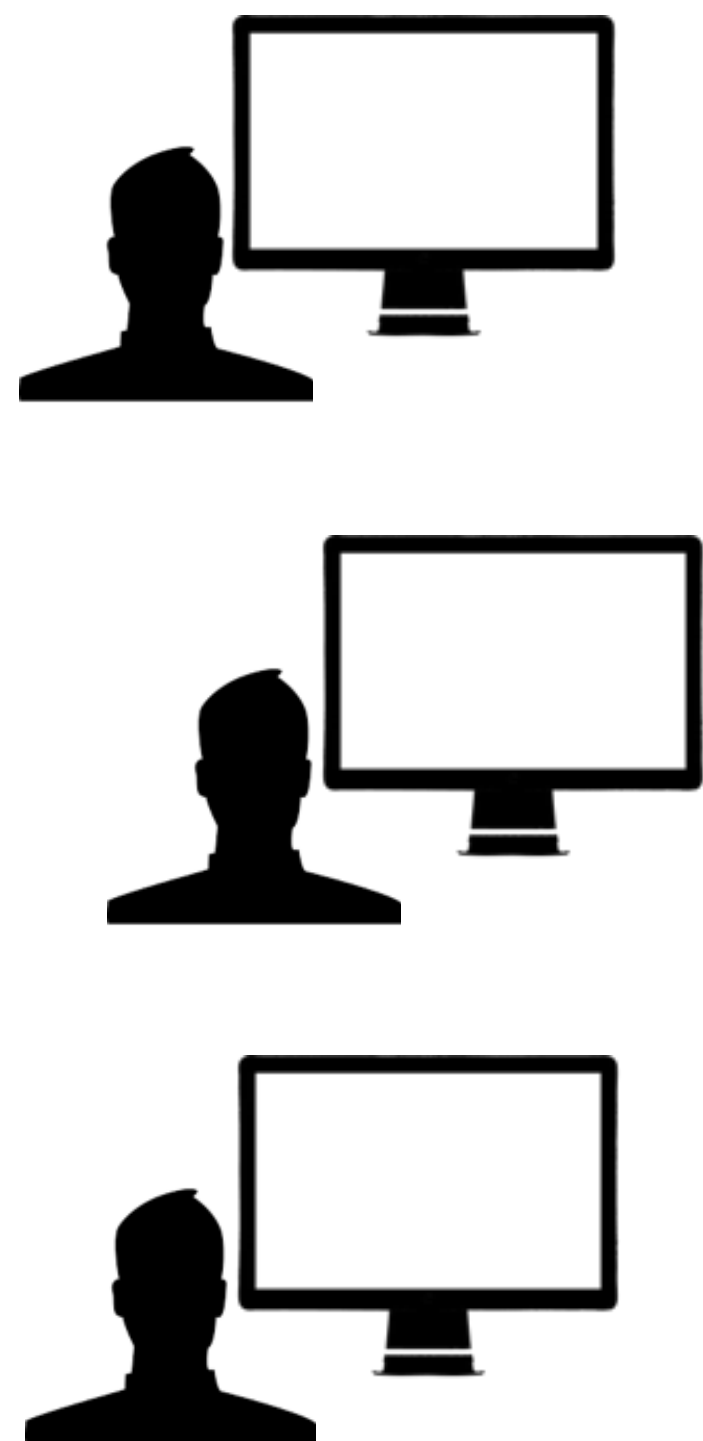


experimentation
server

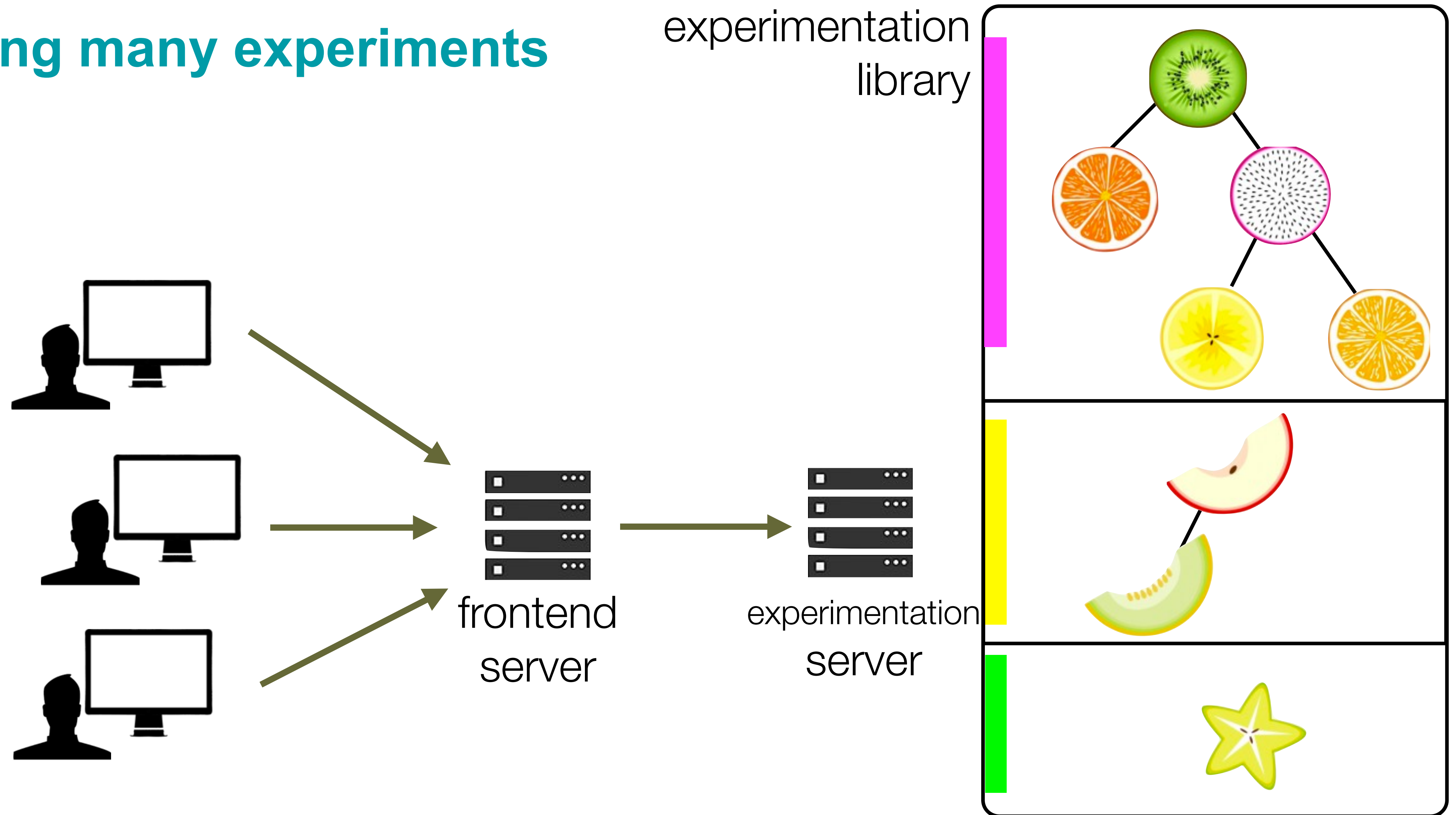
experimentation
library



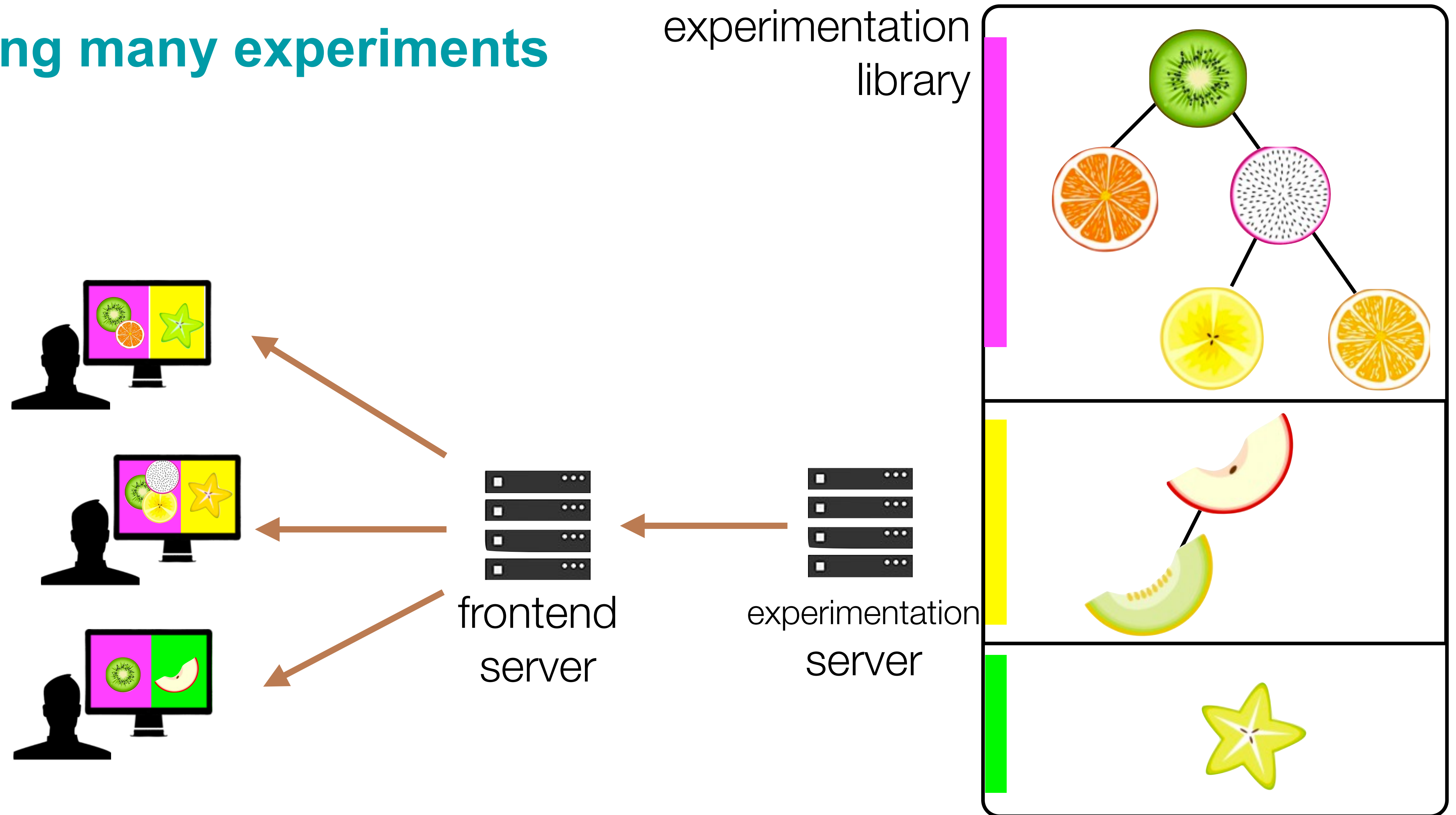
Serving many experiments



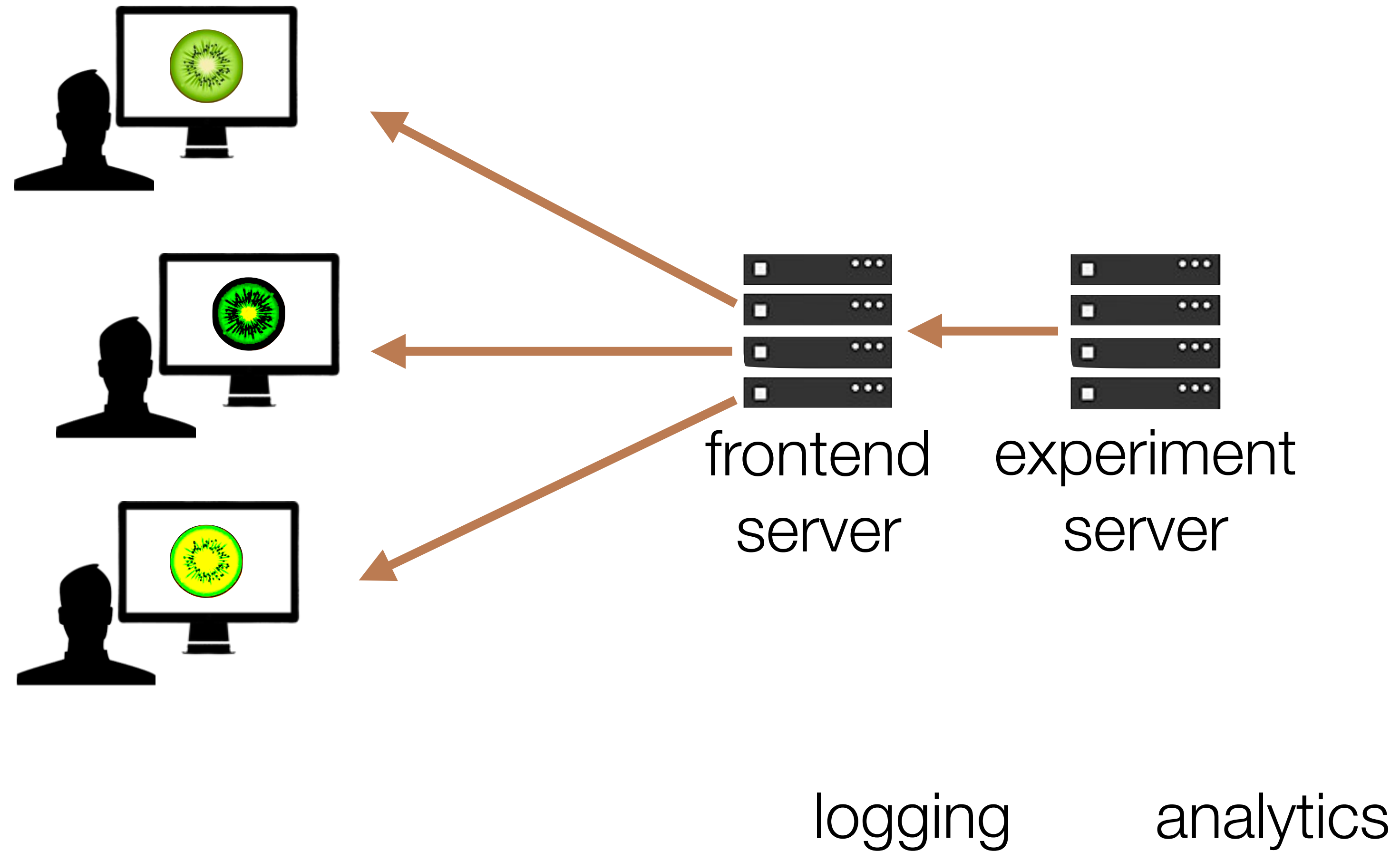
Serving many experiments



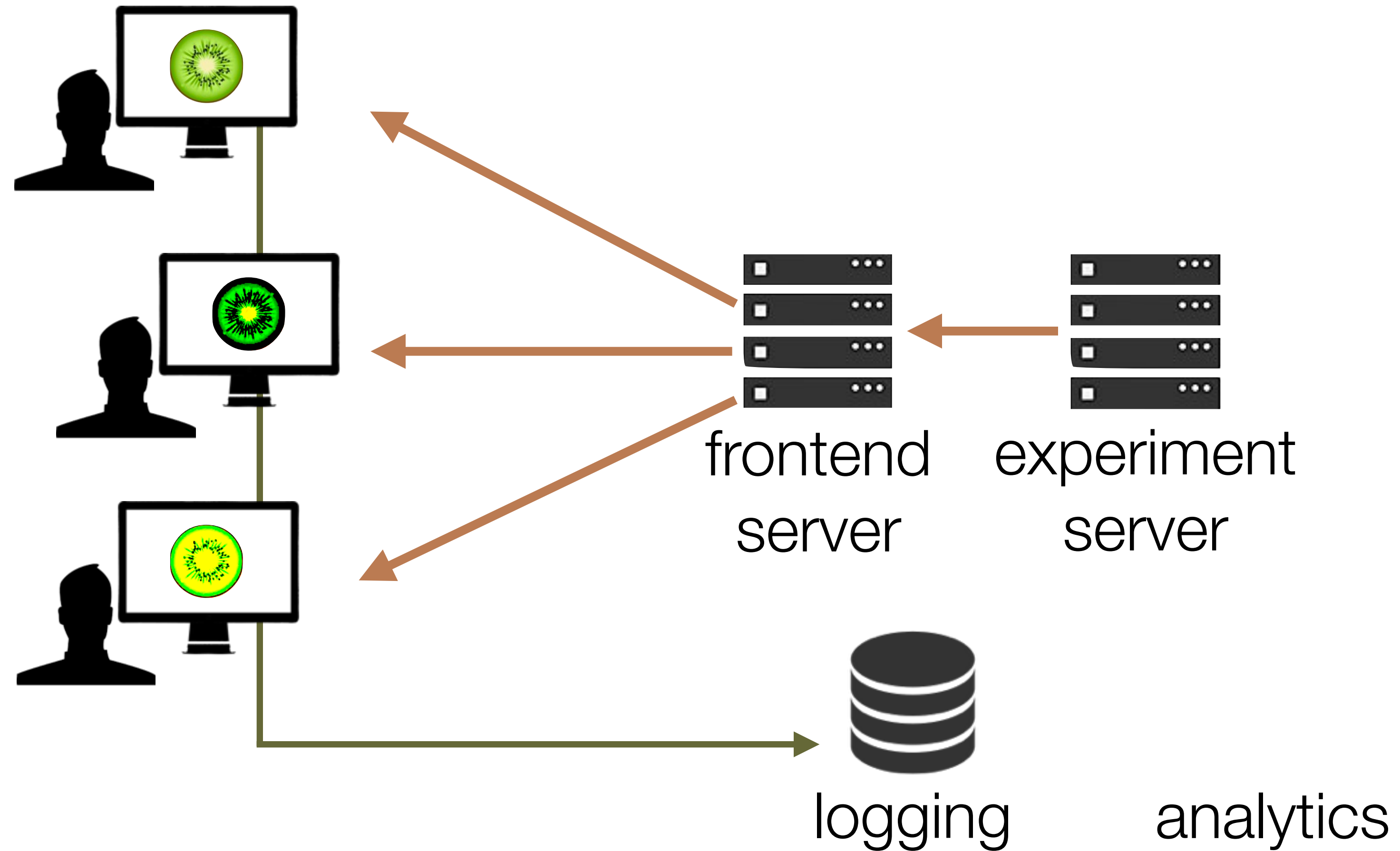
Serving many experiments



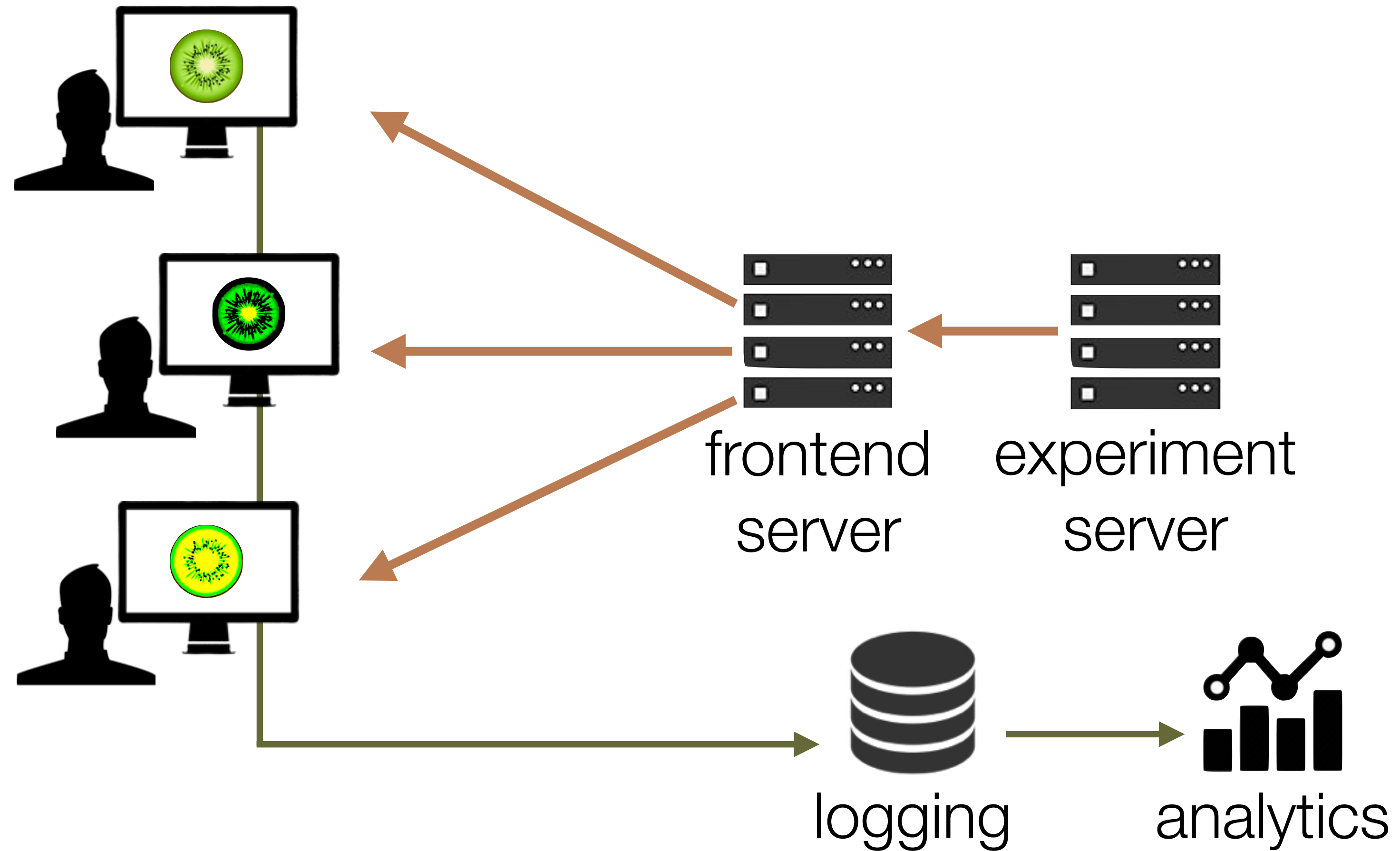
Getting feedback from experiments



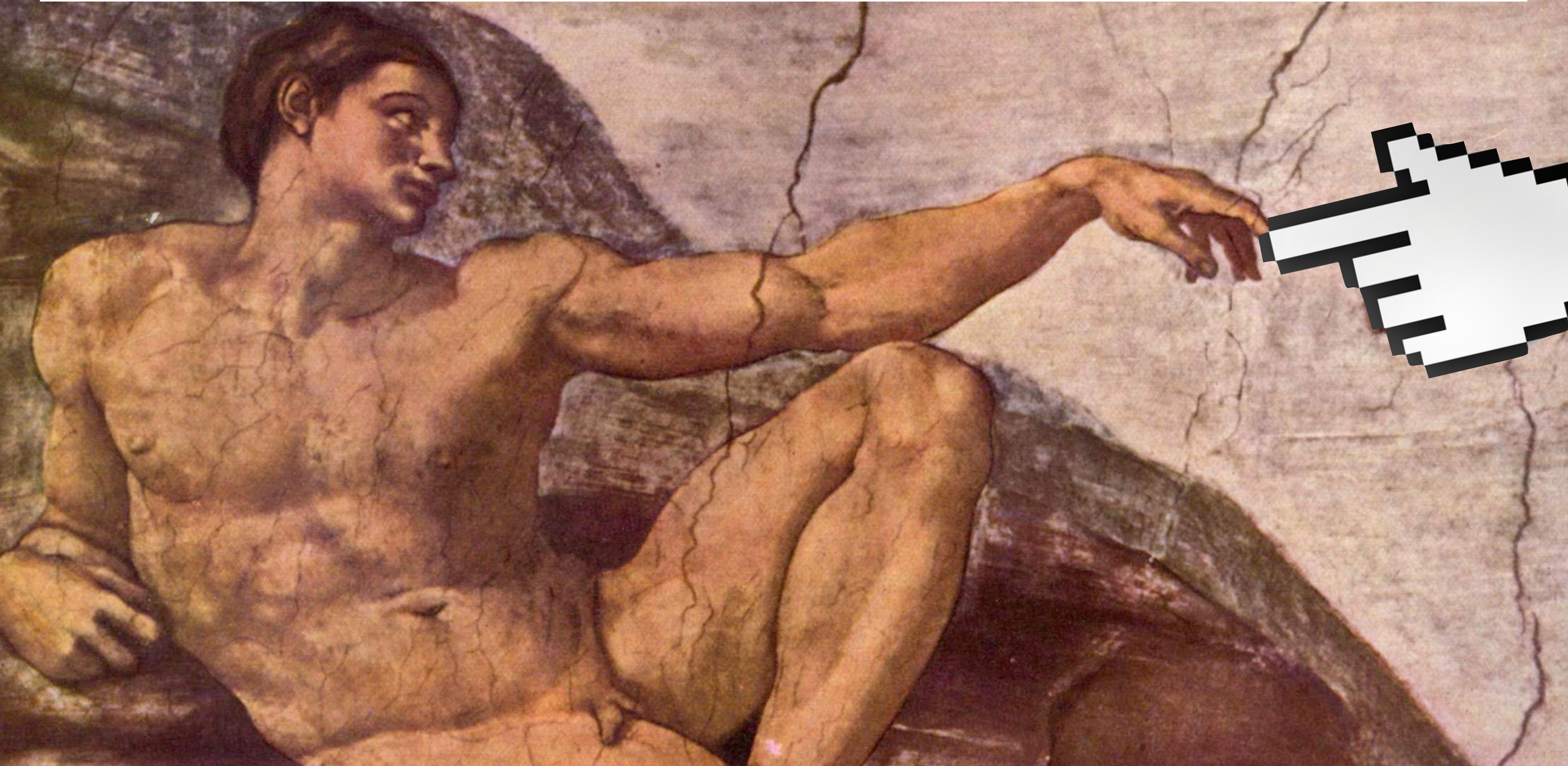
Getting feedback from experiments



Getting feedback from experiments



A scalable experimentation system is an art



Experimentation performance considerations

Experimentation performance considerations



Experimentation performance considerations



**caching
ability**

Experimentation performance considerations

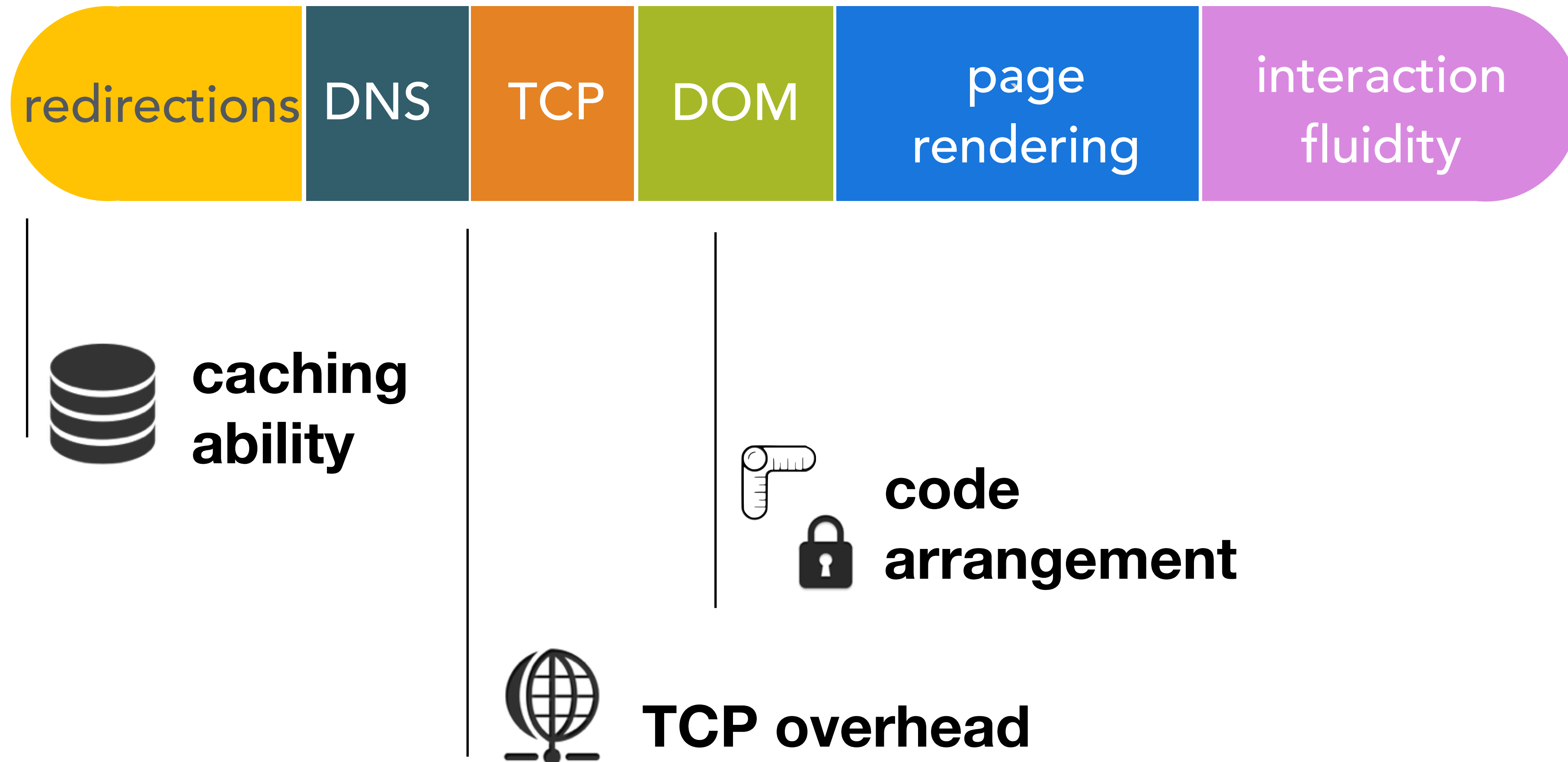


**caching
ability**

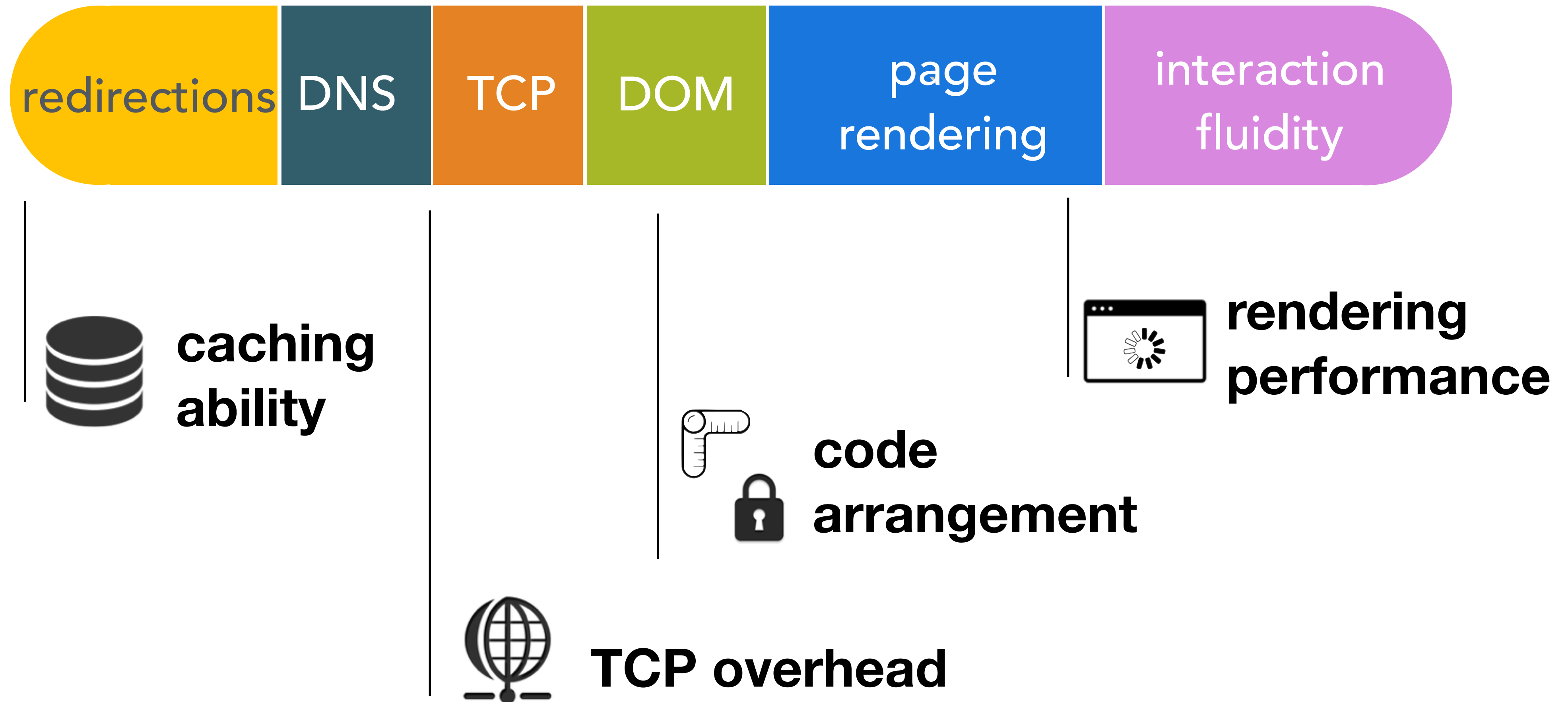


TCP overhead

Experimentation performance considerations



Experimentation performance considerations



Code arrangement: embed/replace

javascript

```
if (inExperiment(EXP1)) {  
  if (inTreatment(V1)) {  
    // Code to variation 1  
  } else if (inVariation(V2)) {  
    // Code to variation 2  
  }  
} else {  
  // Code to base behavior  
}
```

SCSS

```
.feature1 {  
  /* Styling for variation 1. */  
  @if $experiment == EXP1_V1 {  
    color: blue;  
  }  
  /* Styling for variation 2. */  
  @else if $experiment == EXP1_V2 {  
    color: red;  
  }  
  /* Style for base behavior. */  
  @else {  
    color: black;  
  }  
}
```


Code arrangement: embed/replace



One request for all asset needed

Code arrangement: embed/replace



One request for all asset needed



Constant cache invalidation for large exp set



Both used and unused experiments are loaded



Potential leak of unreleased content

Code arrangement: append

base

javascript

```
function feature1() {};  
  
feature1.prototype.handleClick =  
    function(e) {  
        // Code to base behavior.  
    };  
};
```

base

scss

```
.feature1 {  
    /* Style for base behavior. */  
    color: black;  
}
```


Code arrangement: append

base

javascript

```
function feature1() {};  
  
feature1.prototype.handleClick =  
  function(e) {  
    // Code to base behavior.  
  };  
};
```

+

EXP1_V1 override

javascript

```
feature1.prototype.handleClick =  
  function(e) {  
    // Code to variation 1.  
  }  
};
```

base

scss

```
.feature1 {  
  /* Style for base behavior. */  
  color: black;  
}
```

+

EXP1_V1 override

scss

```
.feature1 {  
  /* Styling for variation 1. */  
  color: red;  
}
```

Code arrangement: append



Smaller footprint by loading required experiments only



Unreleased content will not be included

Code arrangement: append



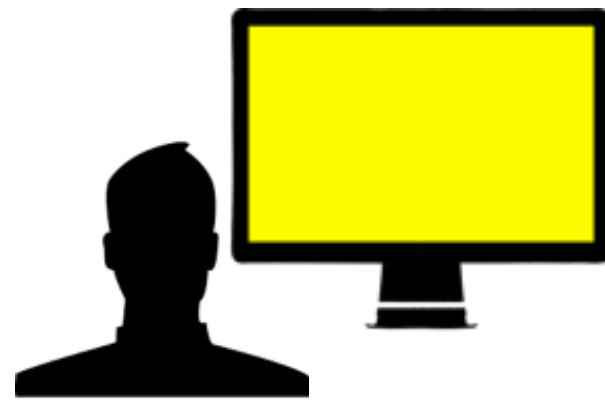
Smaller footprint by loading required experiments only



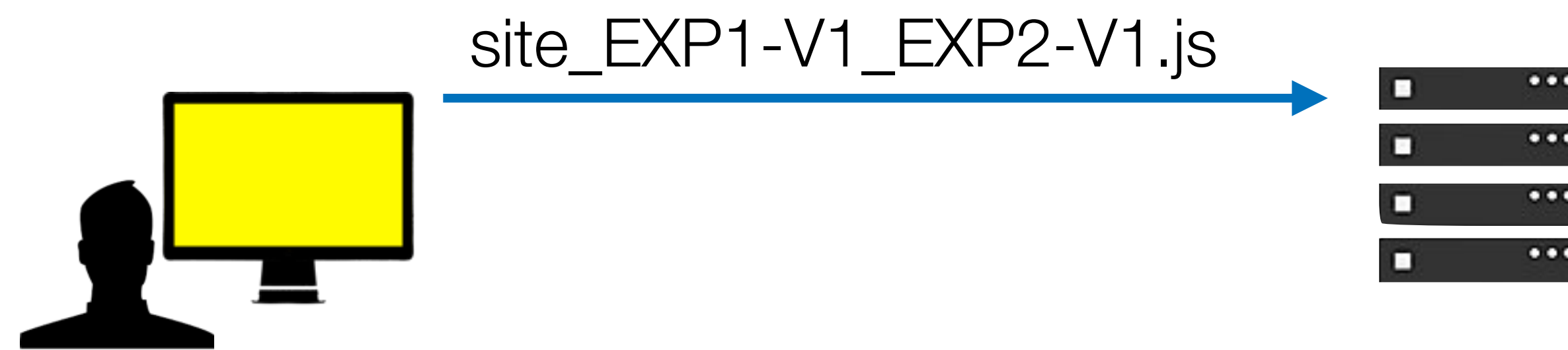
Unreleased content will not be included



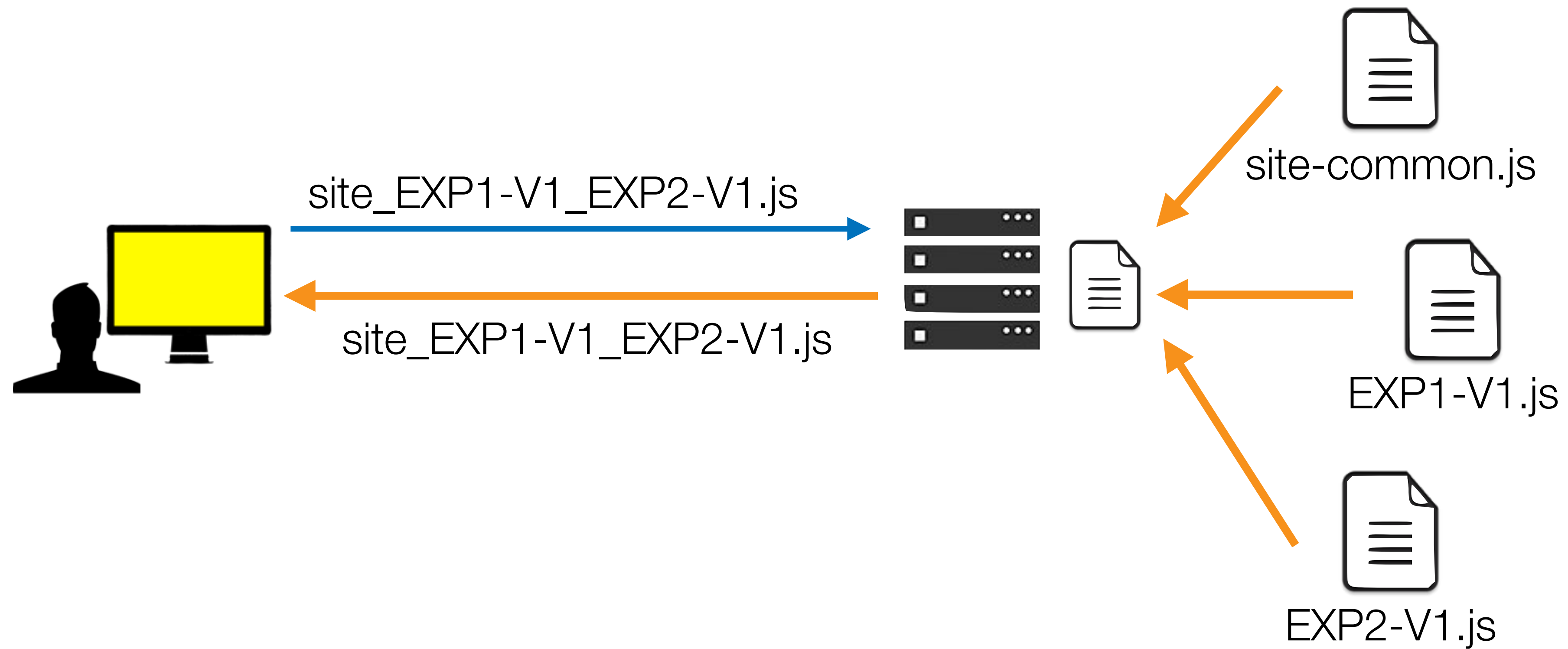
Asset serving: concat



Asset serving: concat



Asset serving: concat



Asset serving: concat



one request for all experiments

Asset serving: concat



one request for all experiments

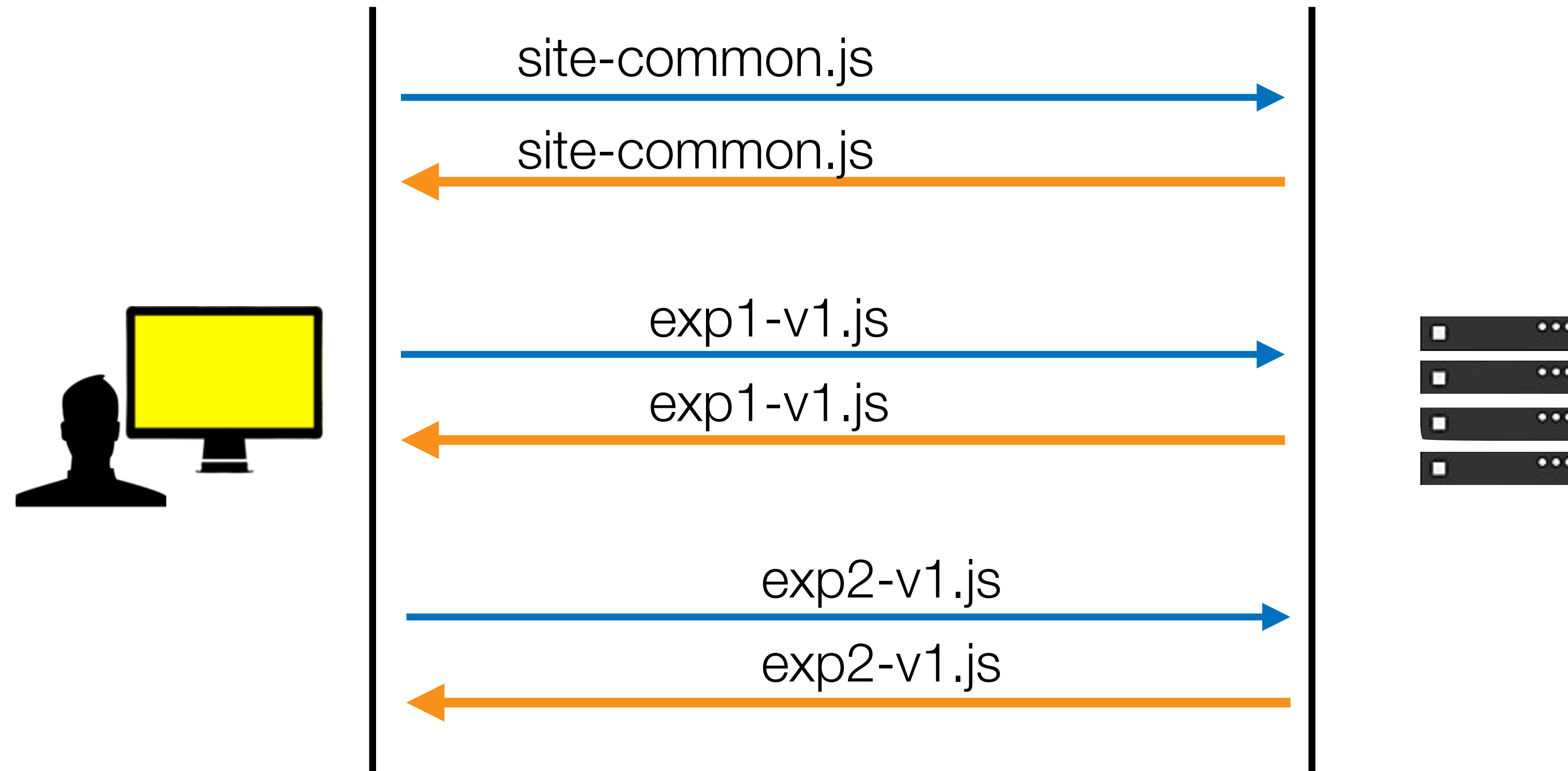


low cache hit for the entire asset

Asset serving: individual



Asset serving: individual



Asset serving: individual



all individual assets are cached

Asset serving: individual

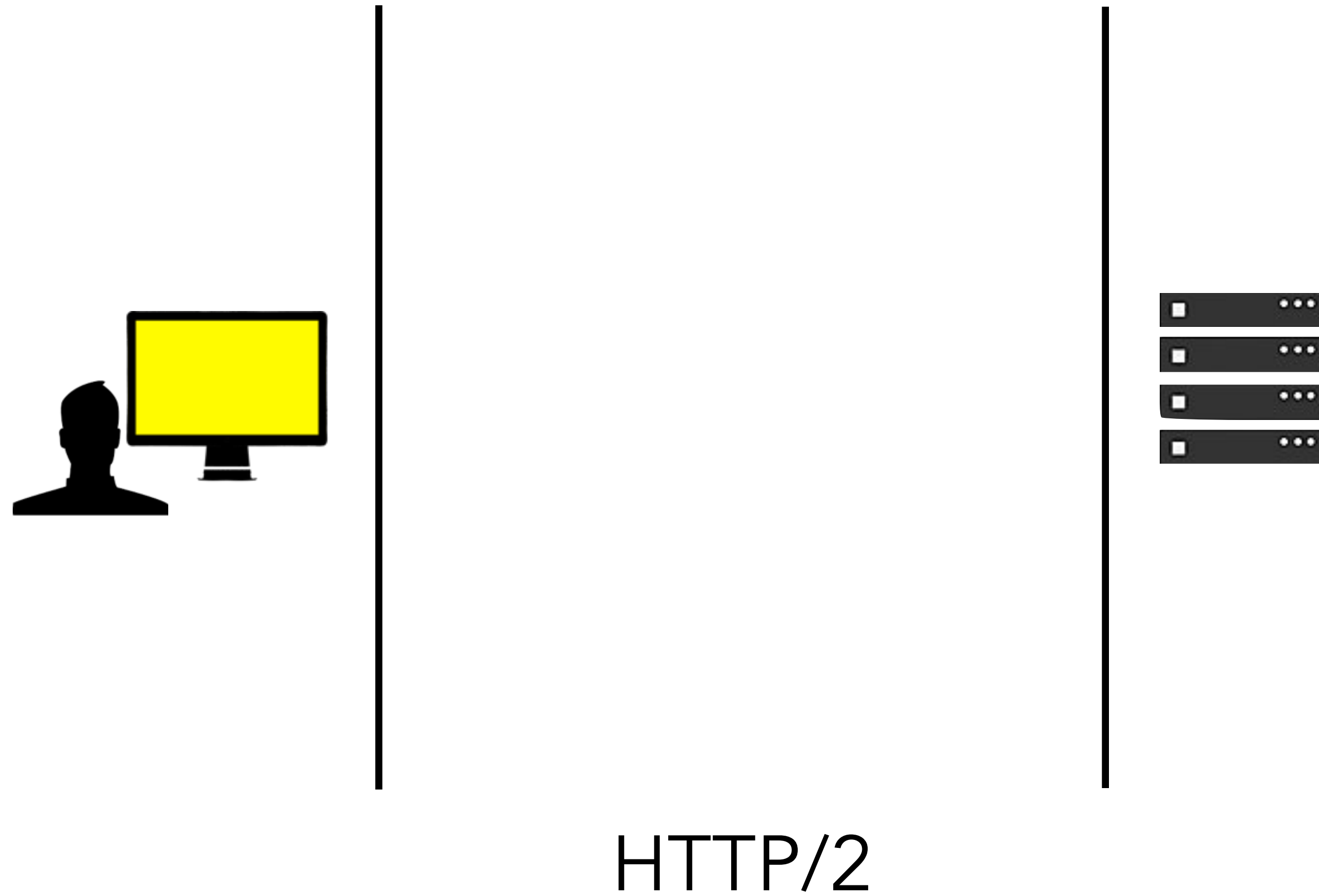


all individual assets are cached

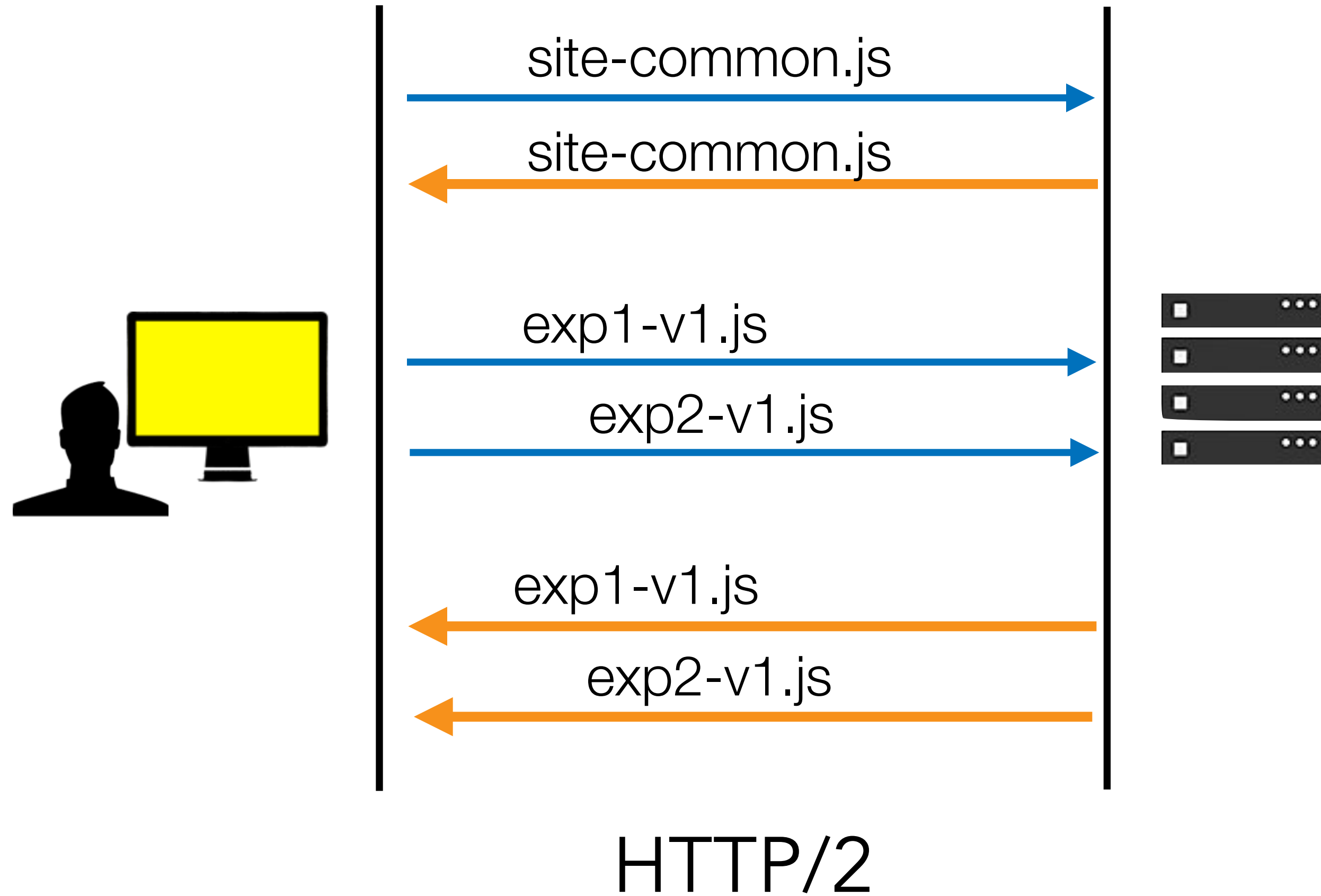


many requests, many overheads

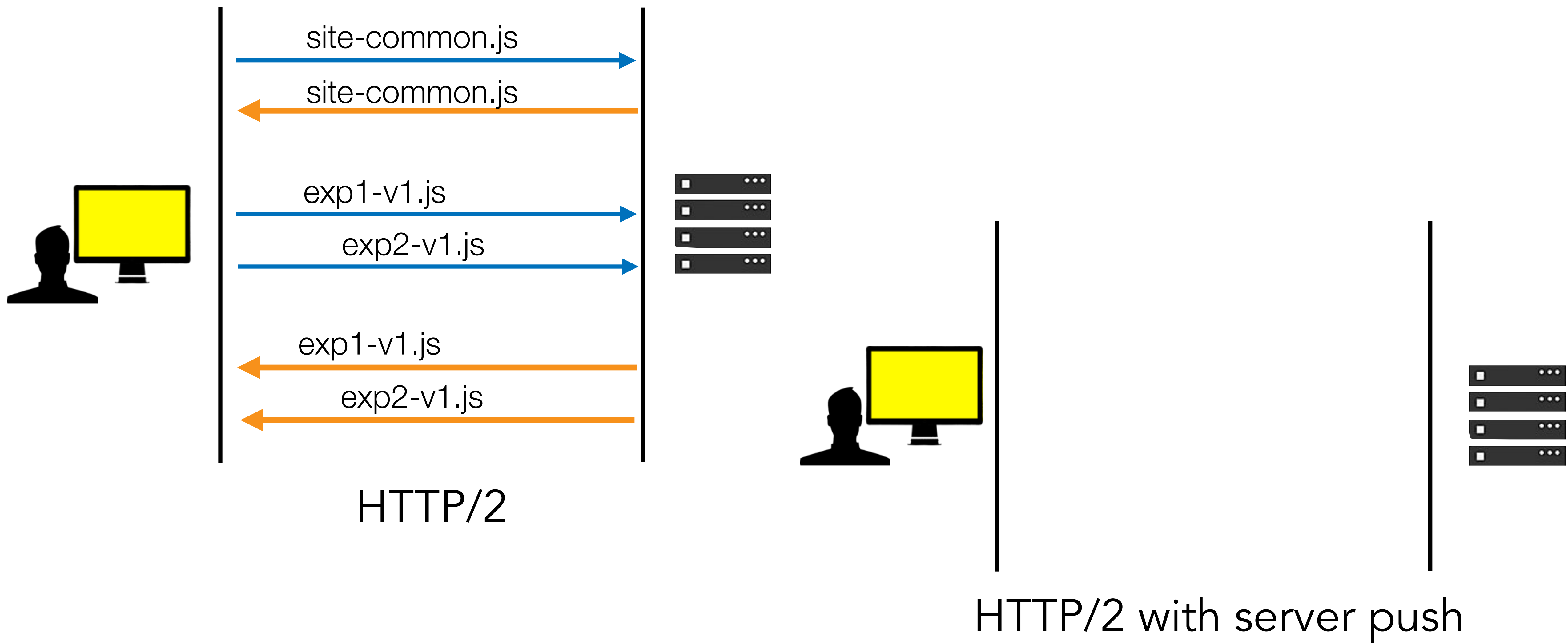
Asset serving: individual with HTTP/2



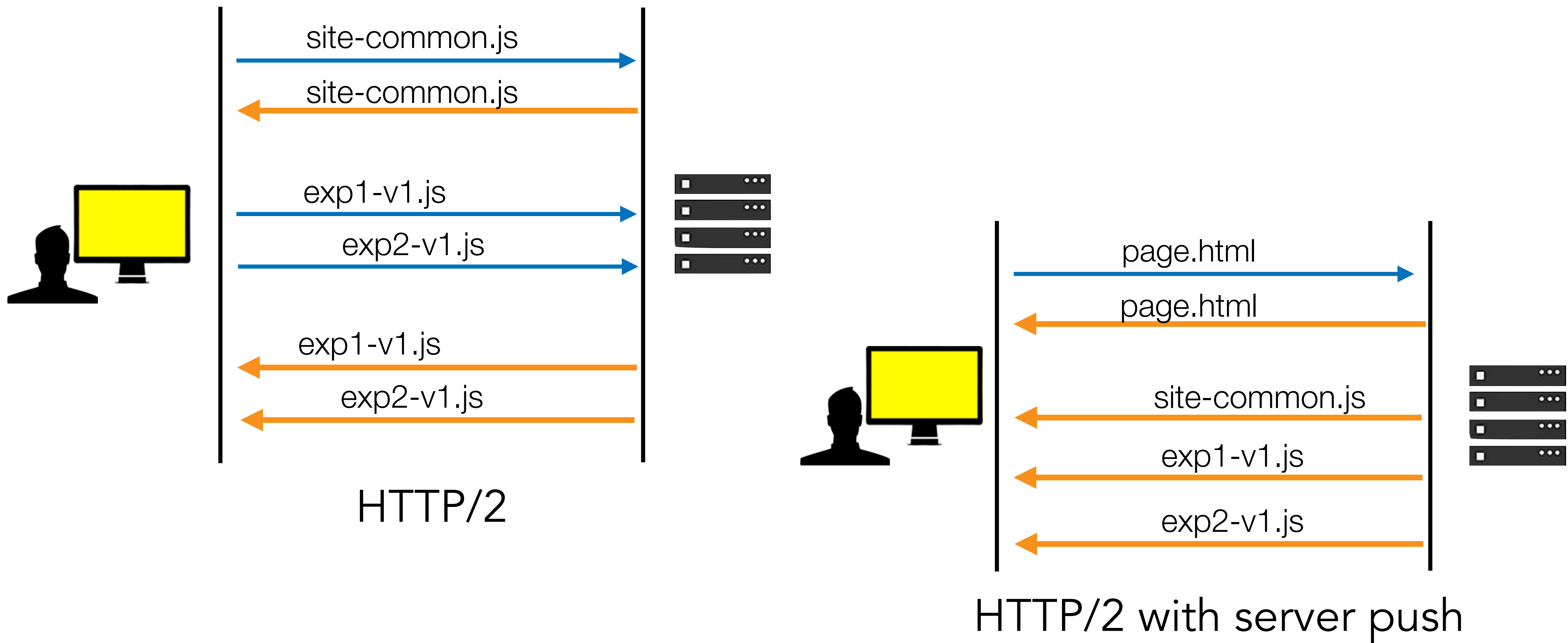
Asset serving: individual with HTTP/2



Asset serving: individual with HTTP/2



Asset serving: individual with HTTP/2



Asset serving: individual with HTTP/2 server push



one TCP connection for all experiments



individual assets are cached

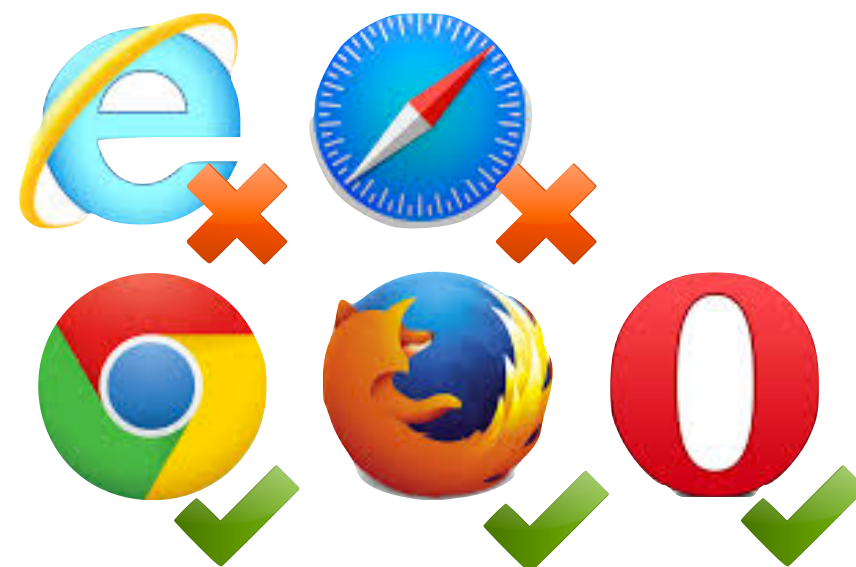
Asset serving: individual with HTTP/2 server push



one TCP connection for all experiments



individual assets are cached

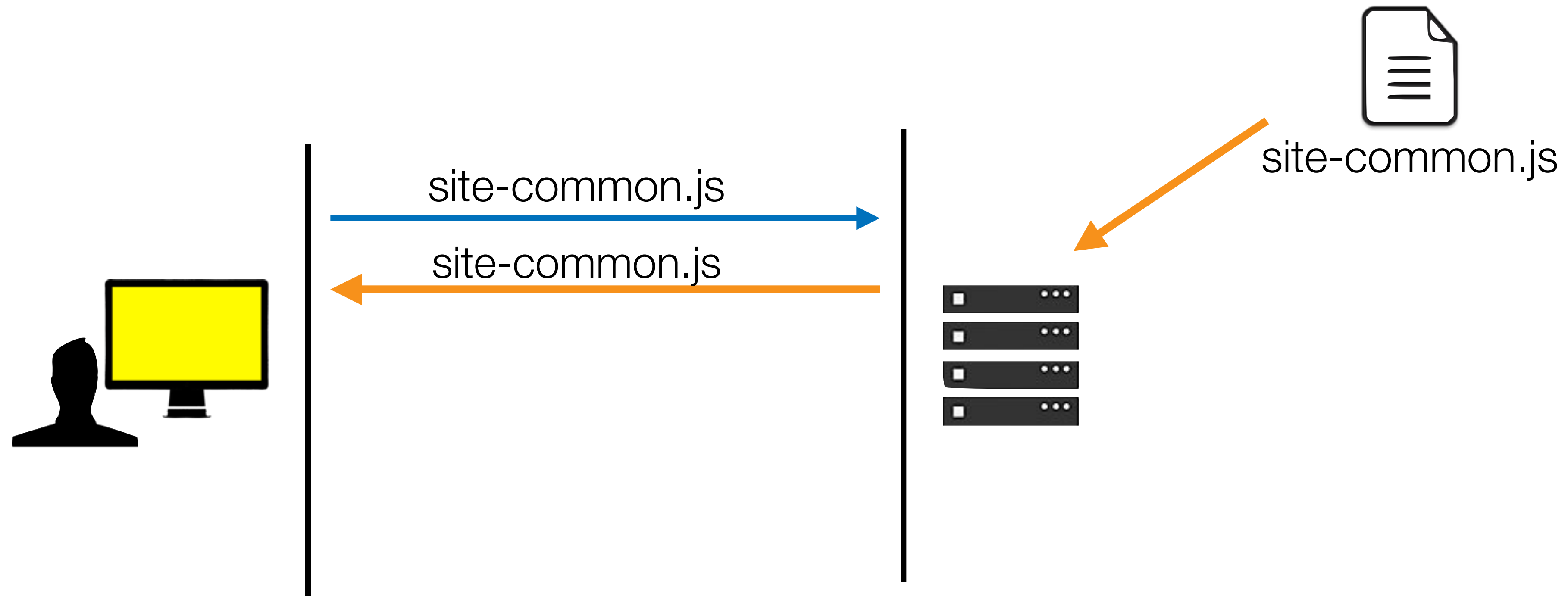


58% browser support

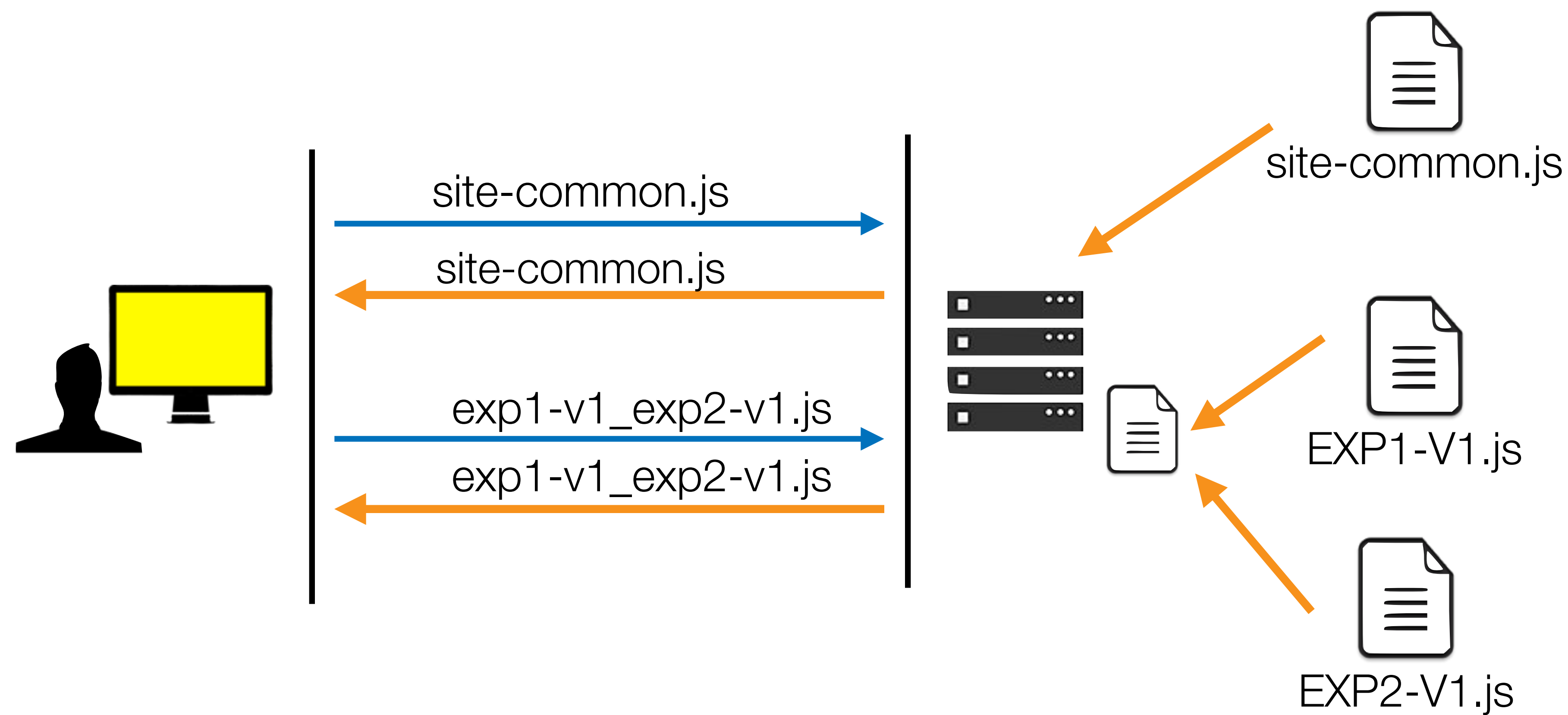
Asset serving: stable/dynamic



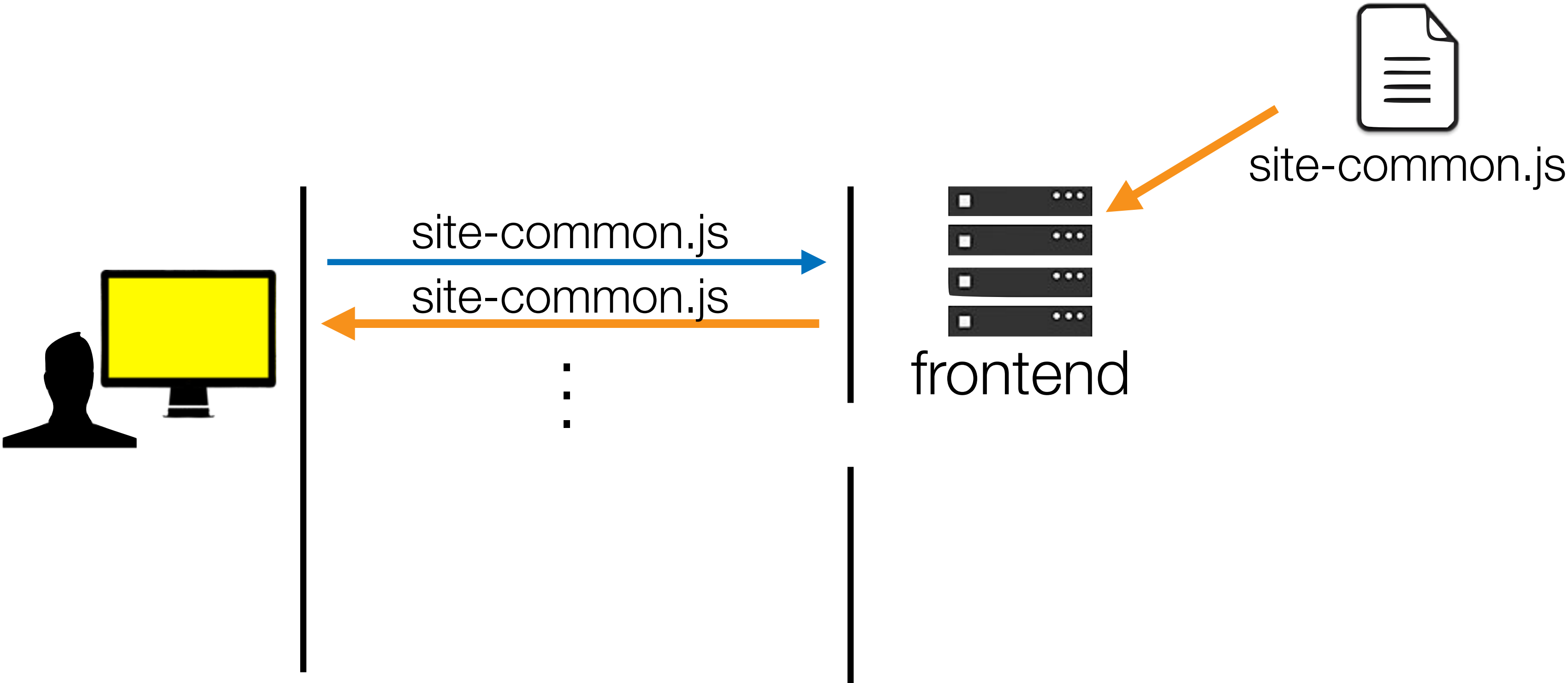
Asset serving: stable/dynamic



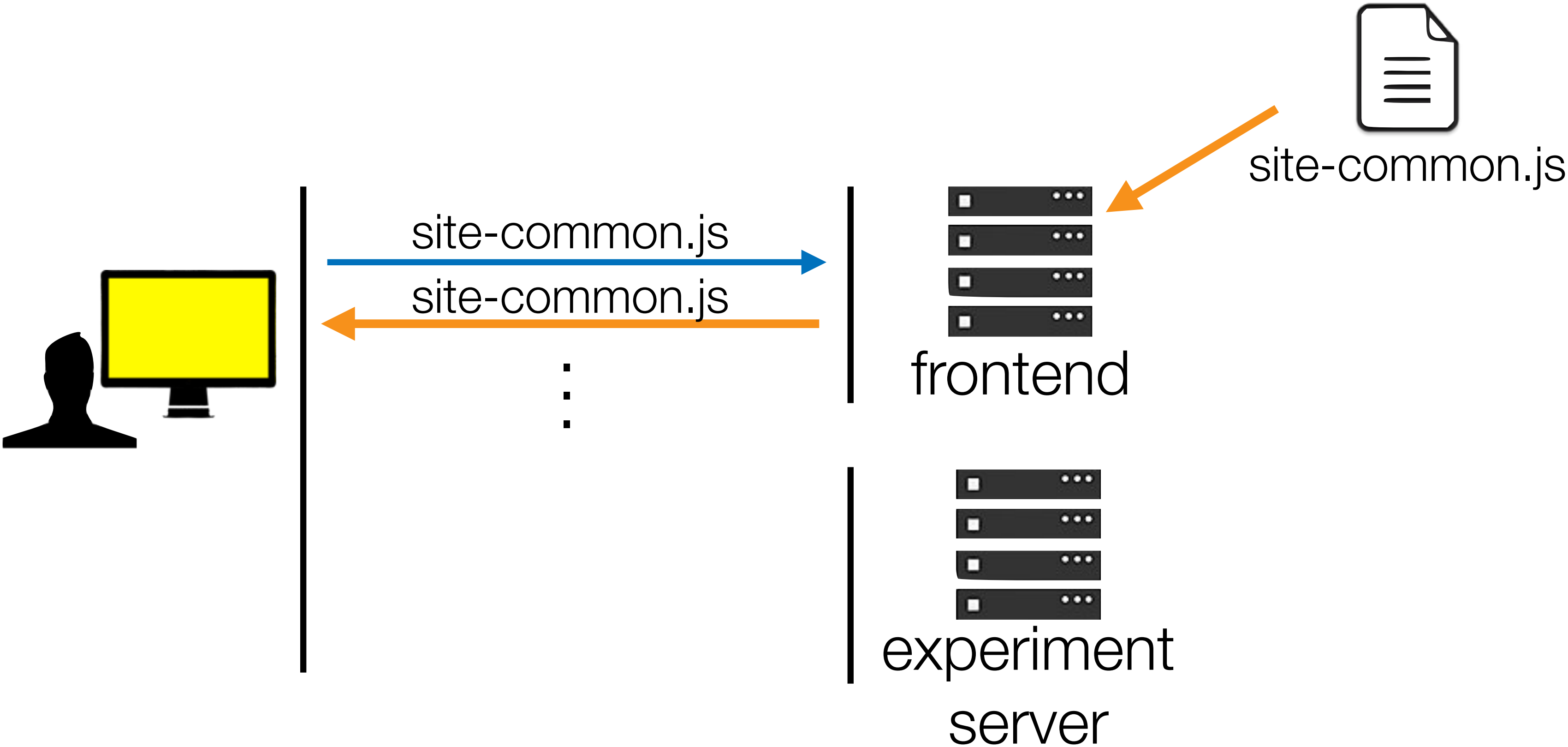
Asset serving: stable/dynamic



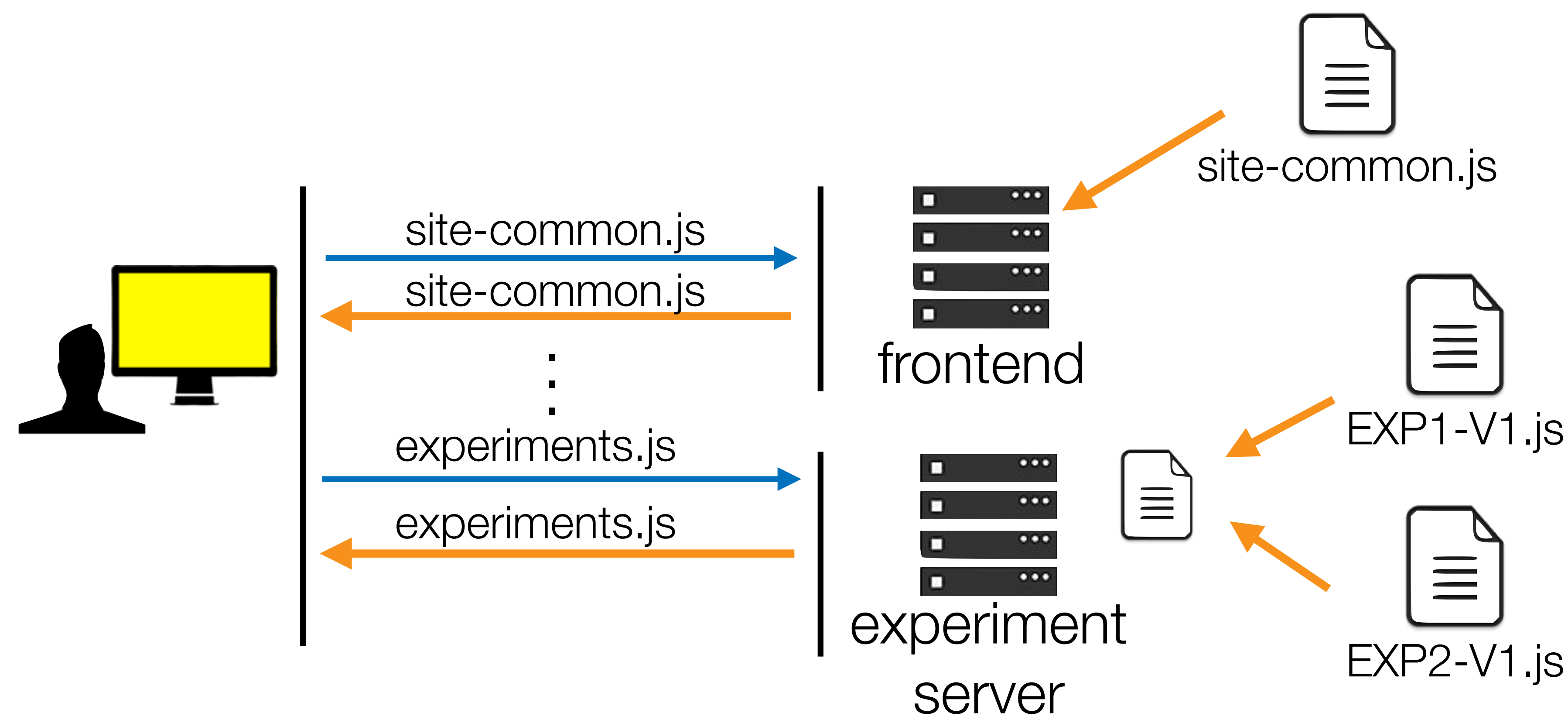
Asset serving: ajax



Asset serving: ajax



Asset serving: ajax



Experimentation performance considerations

