6.1800 Spring 2024

Lecture #1: Complexity, modularity, abstraction

plus an intro to client/server models

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we care about you as people more than we care about any deadline

if you need help, ask for it. we need to balance the needs of a large group of students and the needs of the staff, but we will work with you to help as much as we can. in particular, as long as you reach out to your TA ahead of time, we will give you a 24-hour extension on any assignment, no questions asked.

what is a system?

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“a set of interconnected components that has an expected behavior observed at the interface with its environment.”

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one way is to use a **client/server model**

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how do we enforce modularity?

one way is to use a **client/server model**

the browser is the client in this example

`Class Browser`
(on machine 1)

```
def main():
  html = browser_load_url(URL)
  ...
```

`Class Server`
(on machine 2)

```
def server_load_url():
  ...
  return html
```

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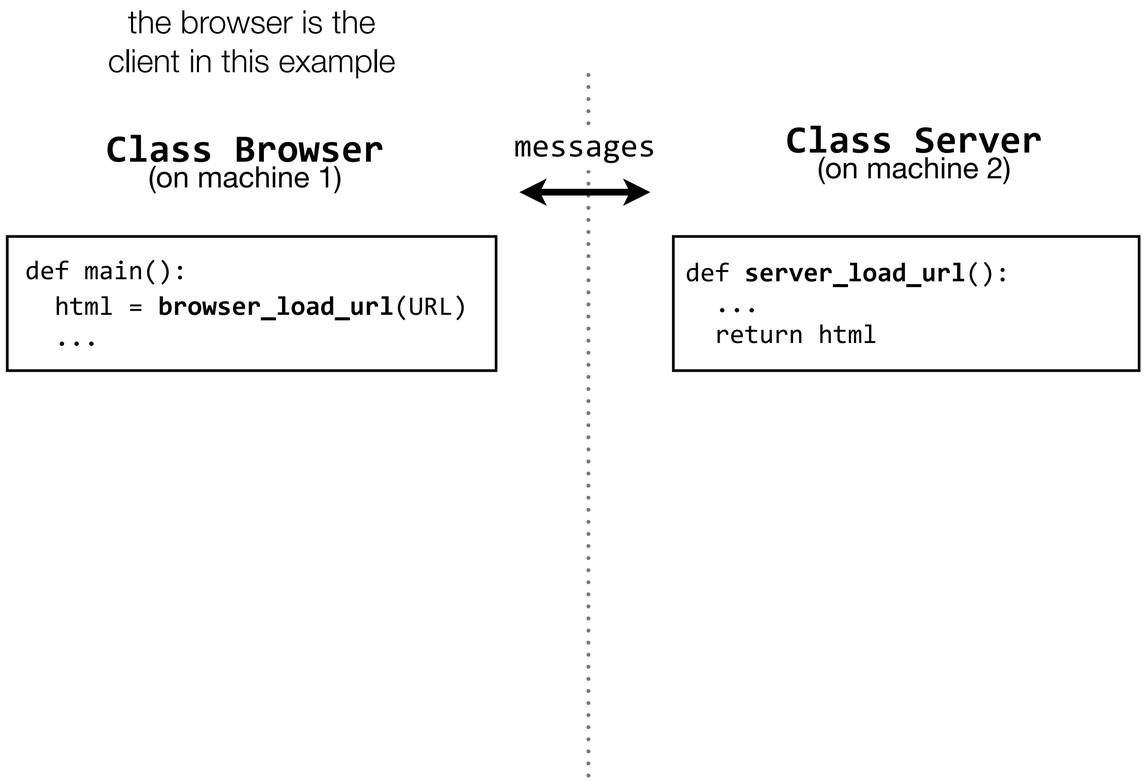

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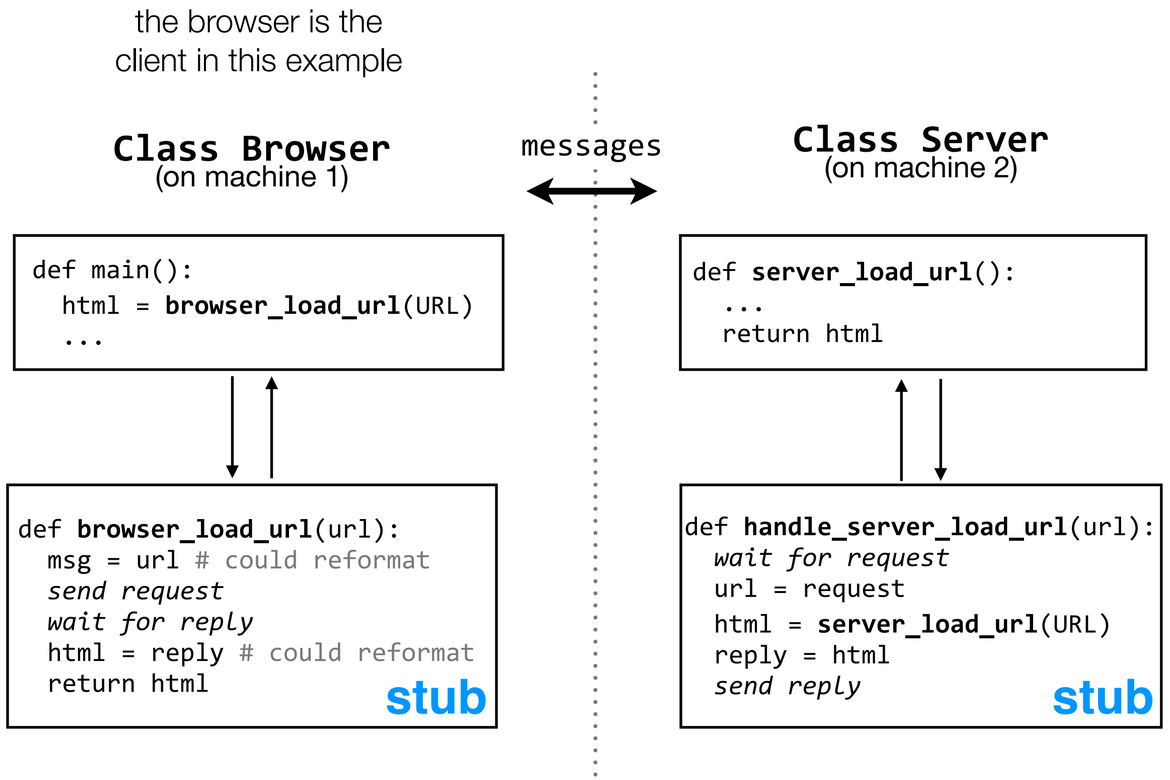

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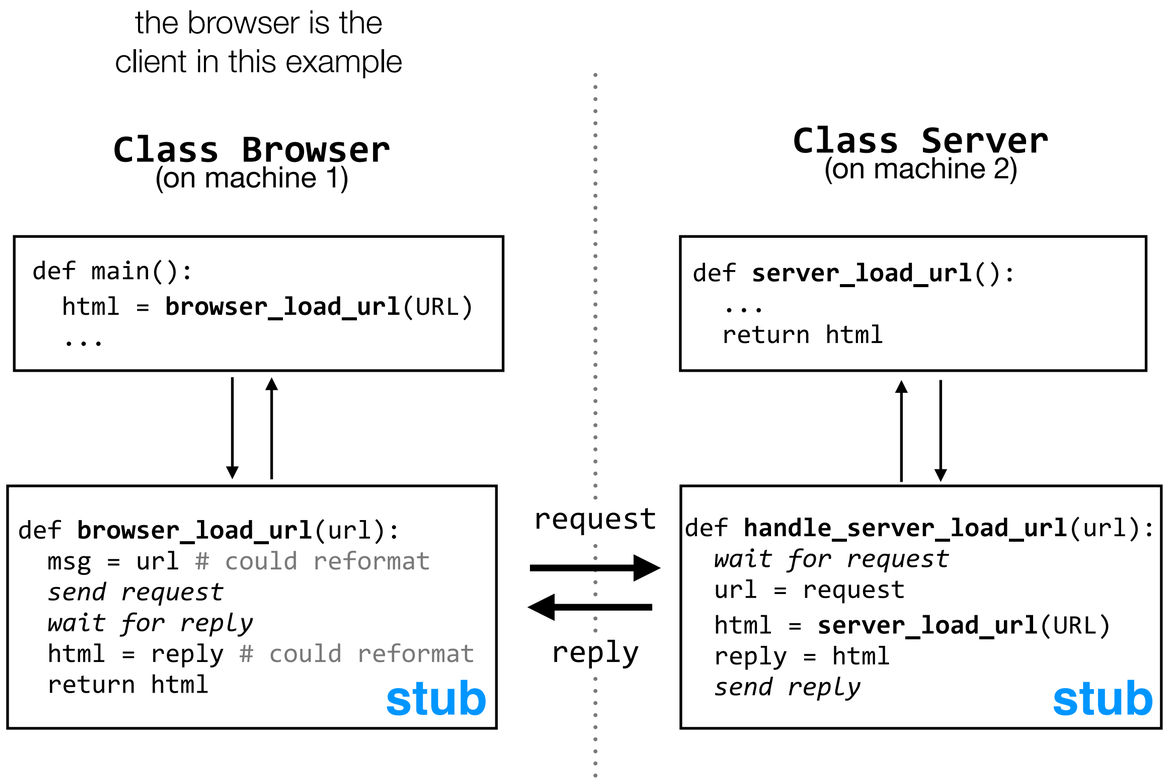

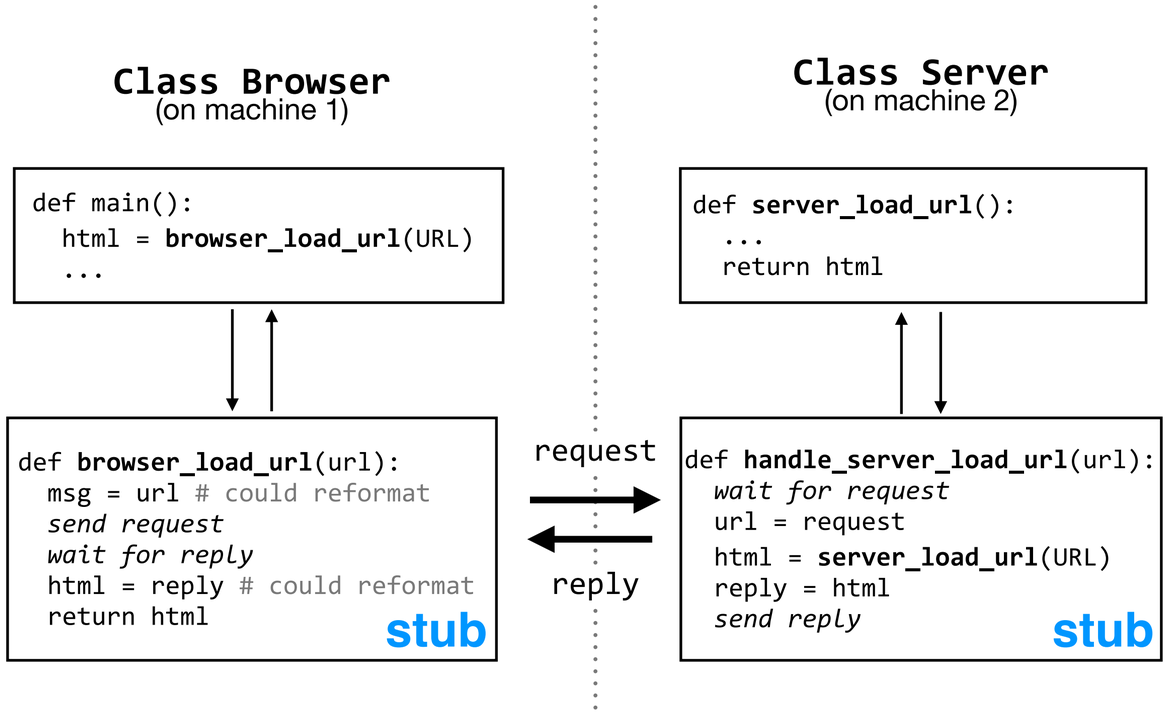
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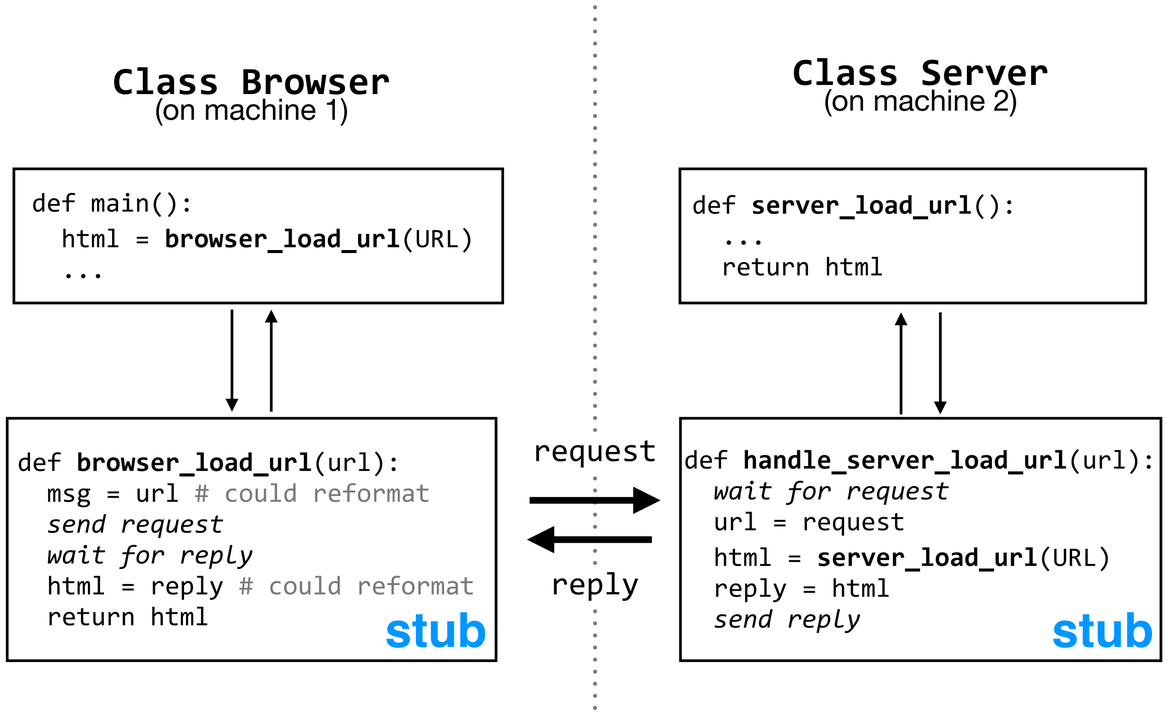
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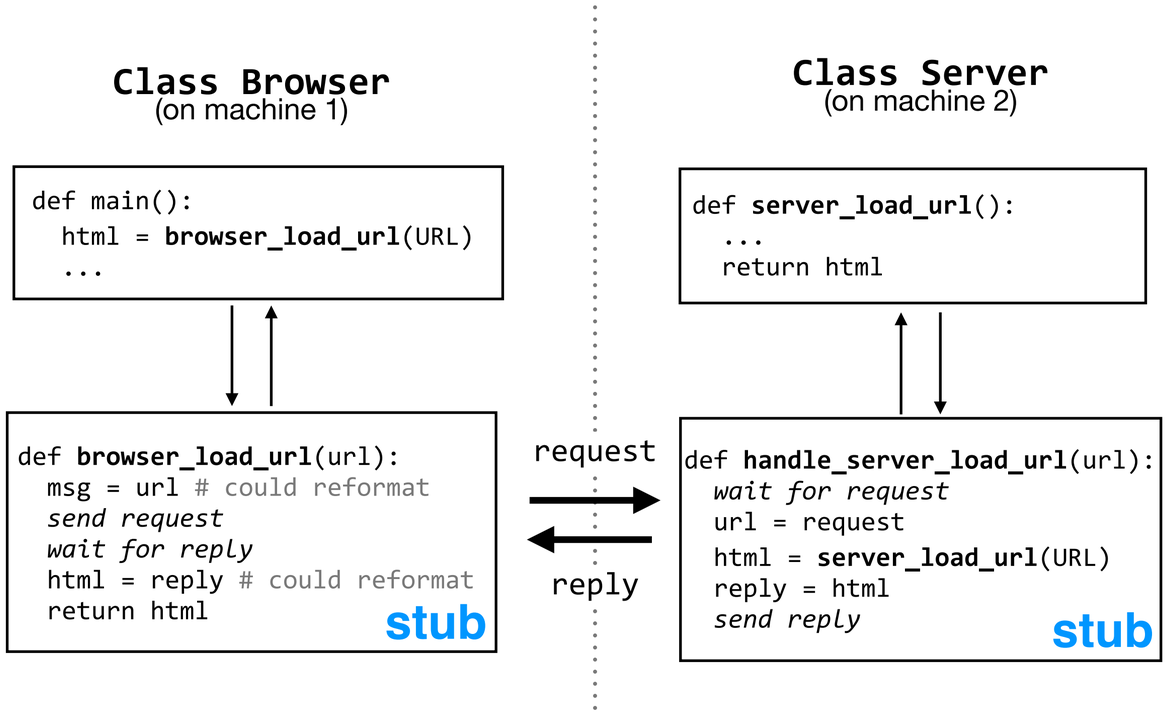
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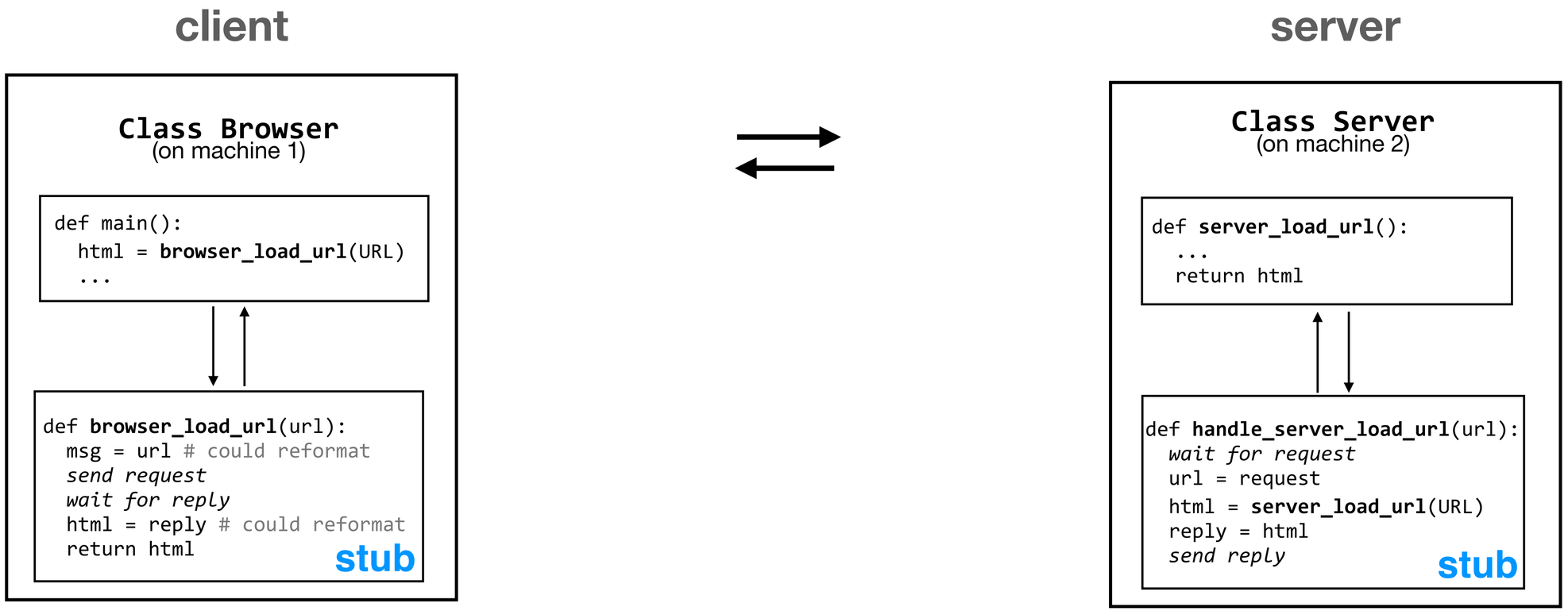
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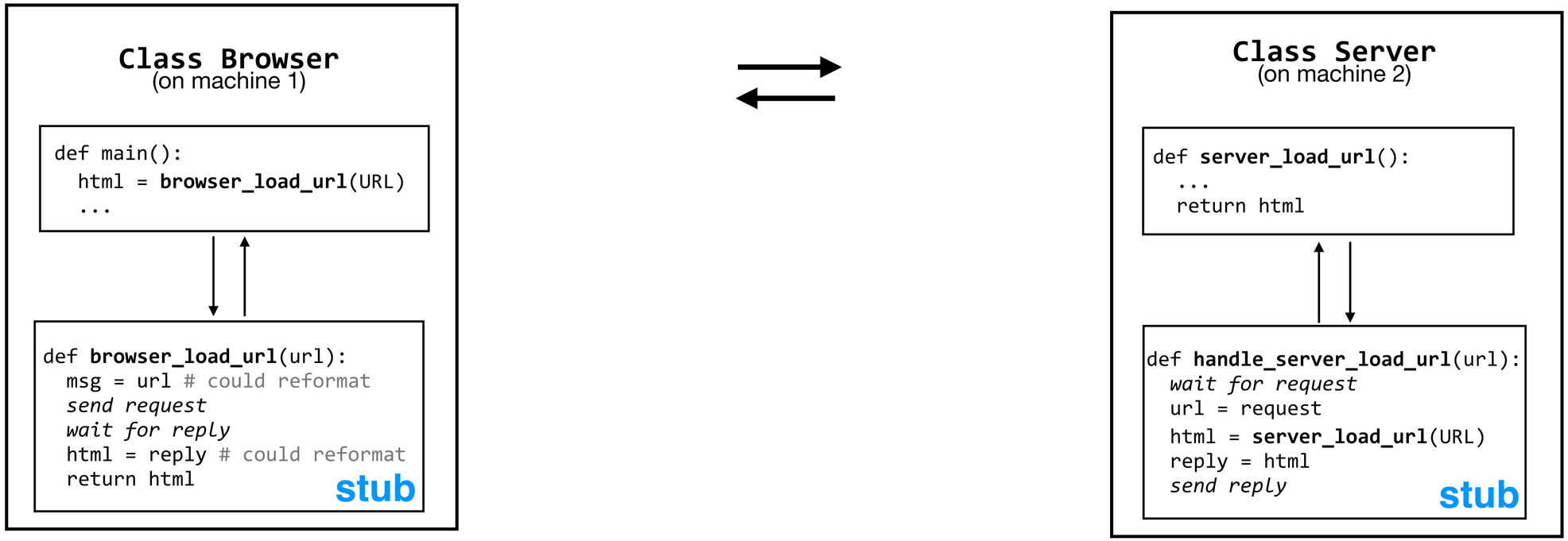

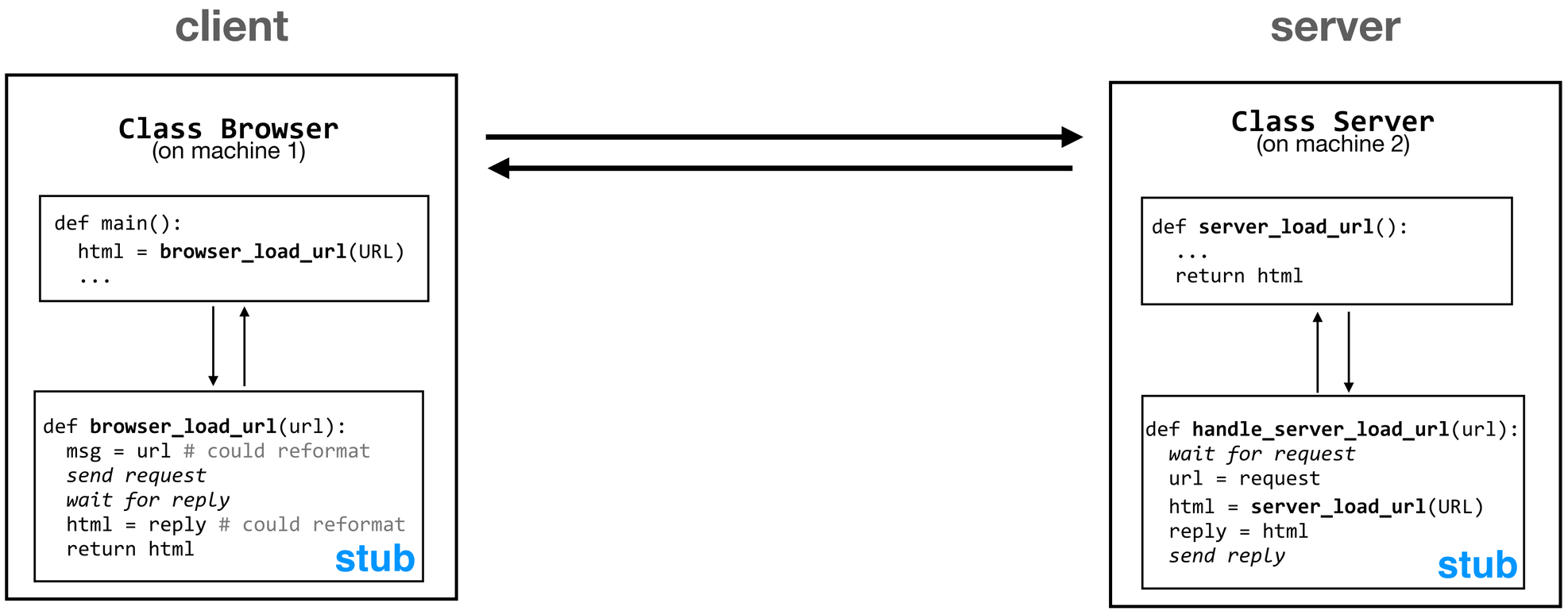
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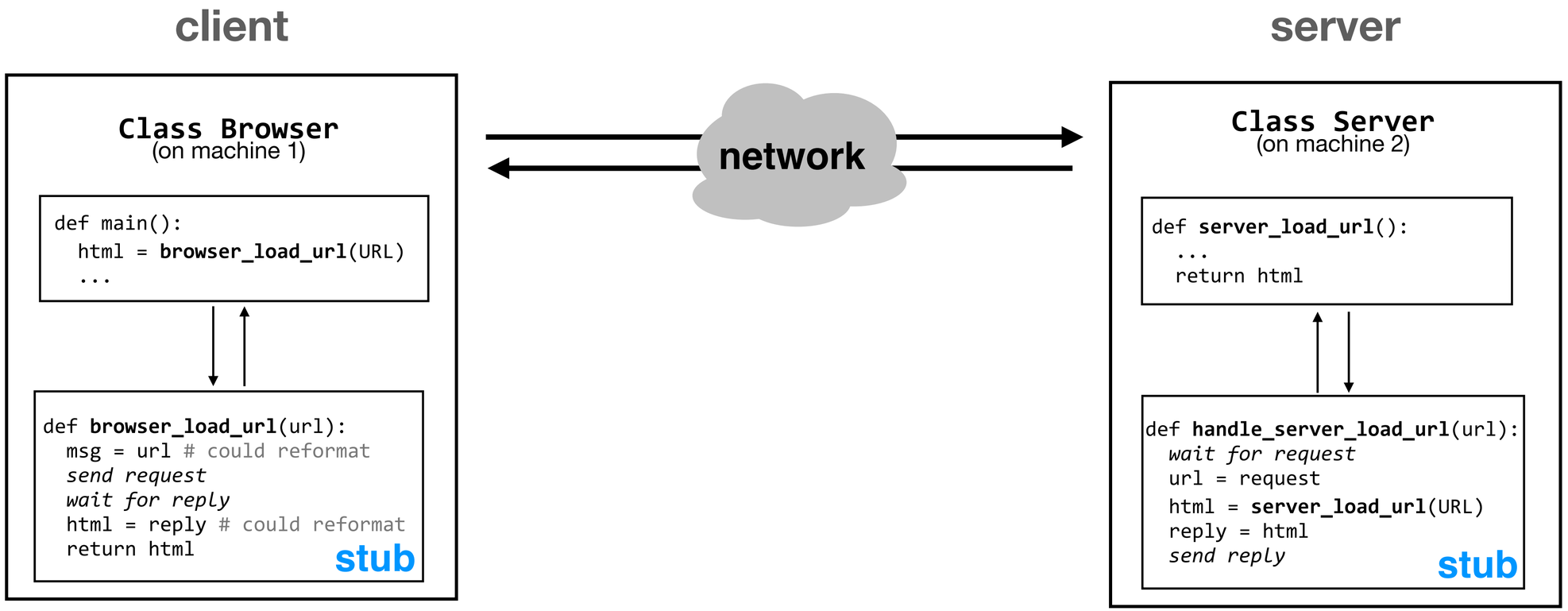
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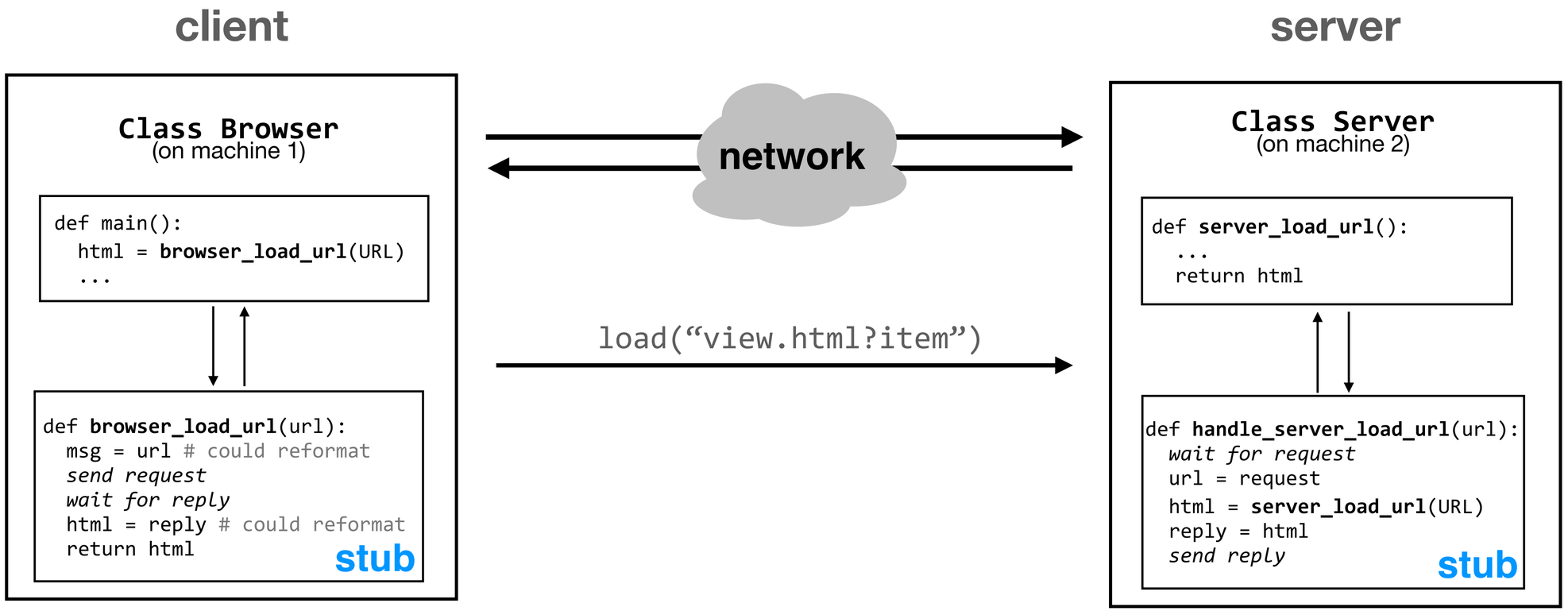
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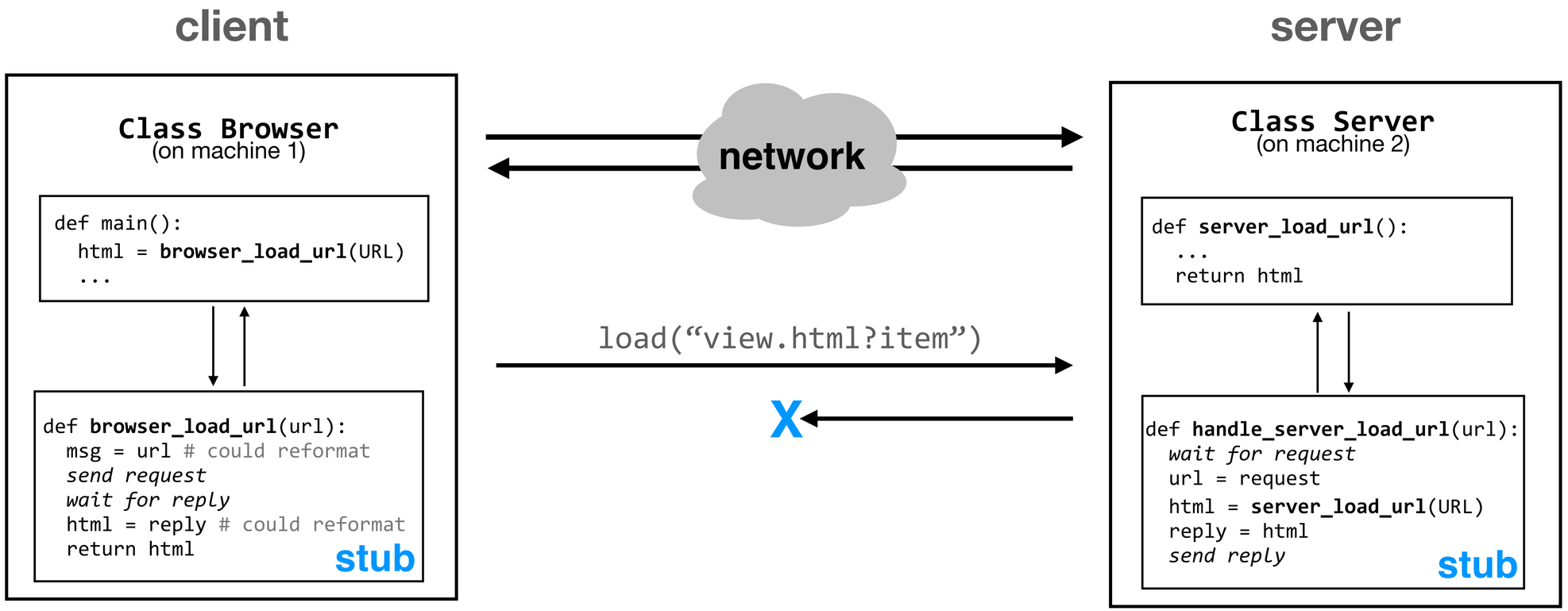
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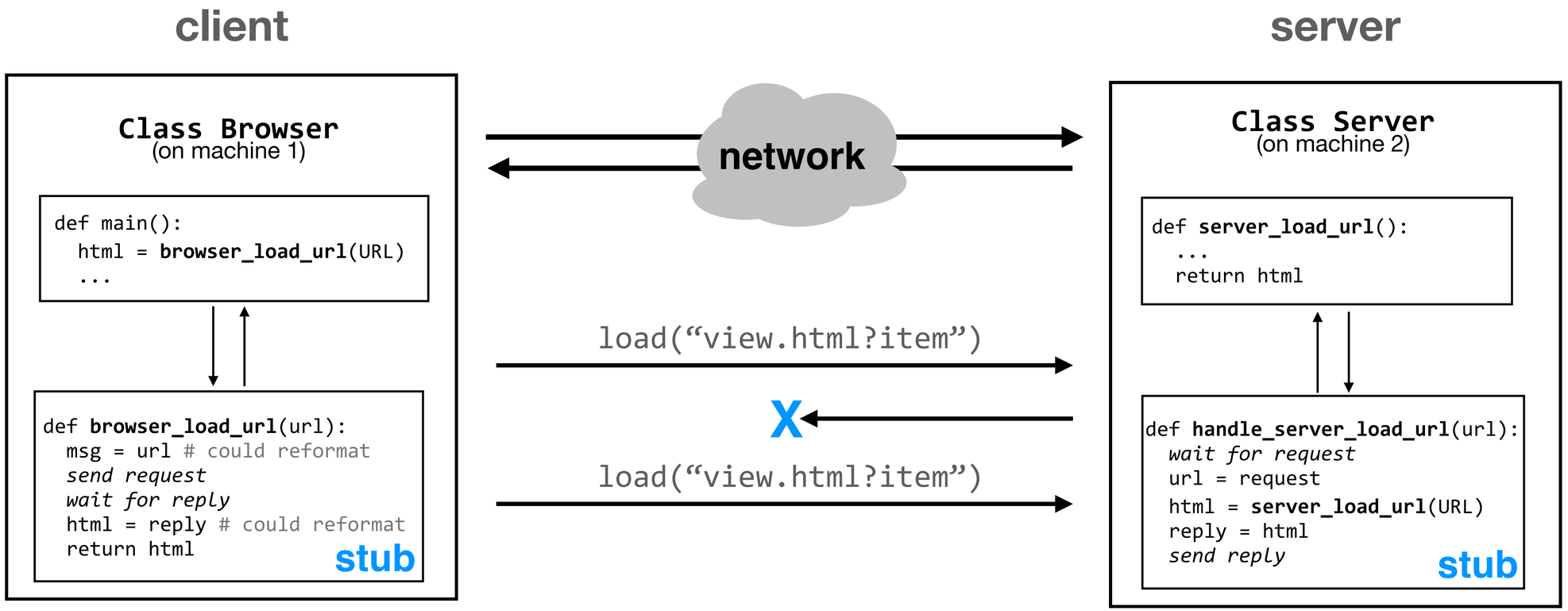
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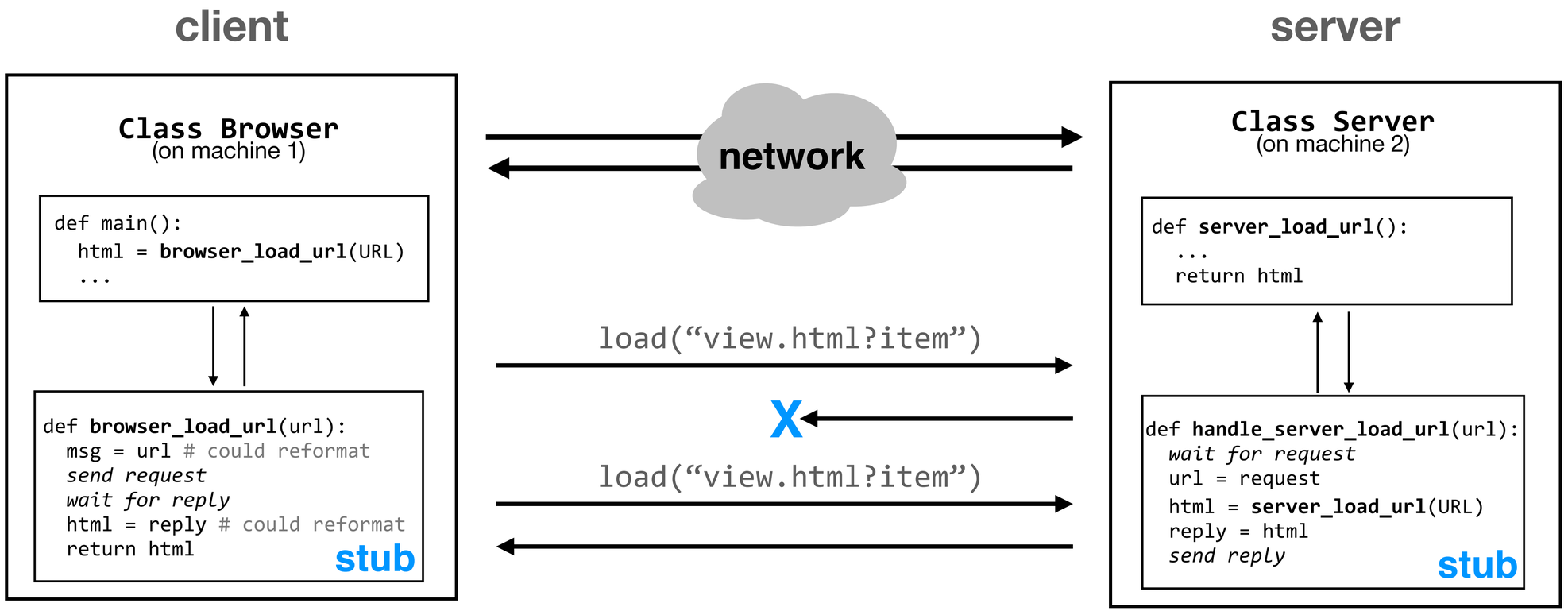
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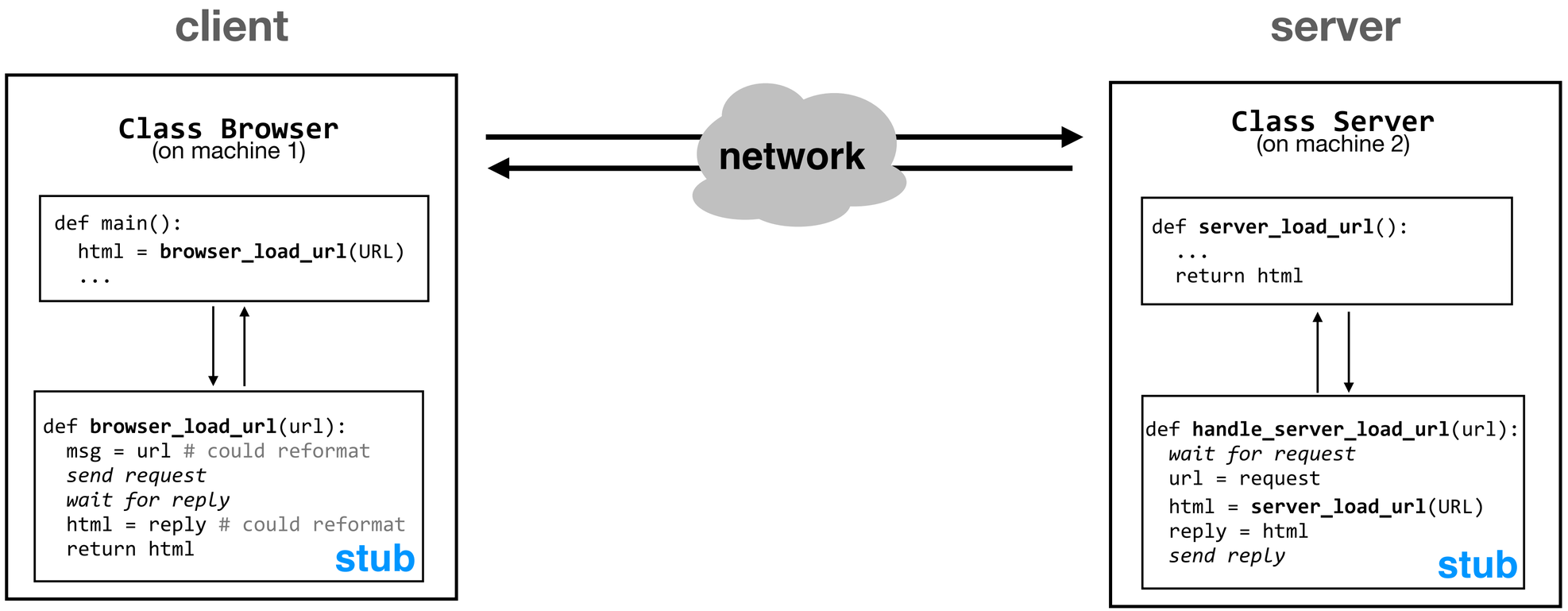
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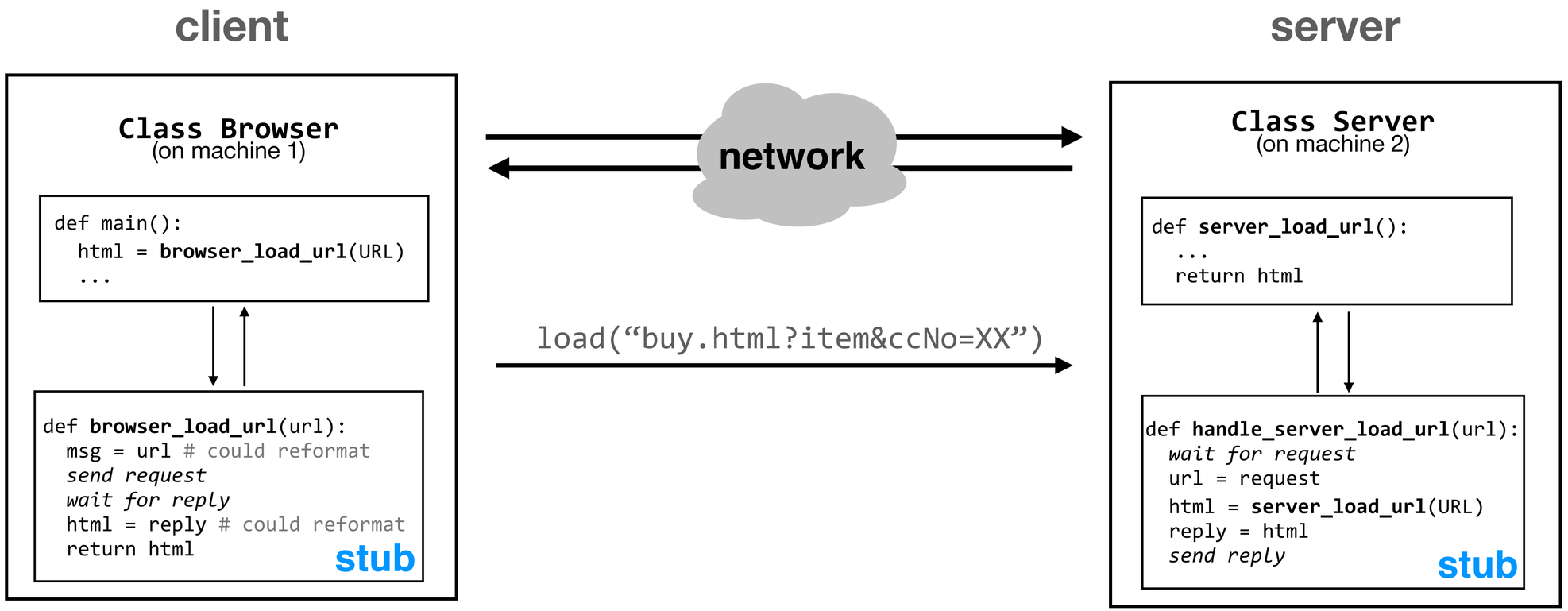
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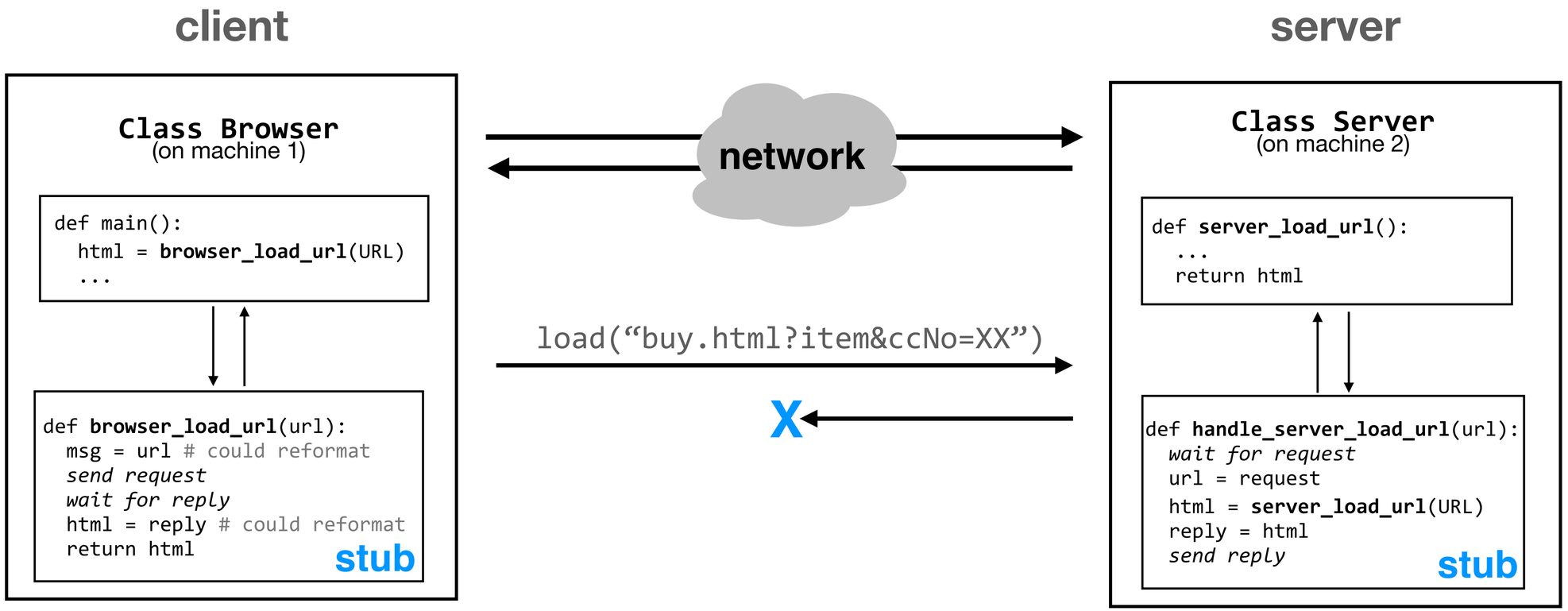
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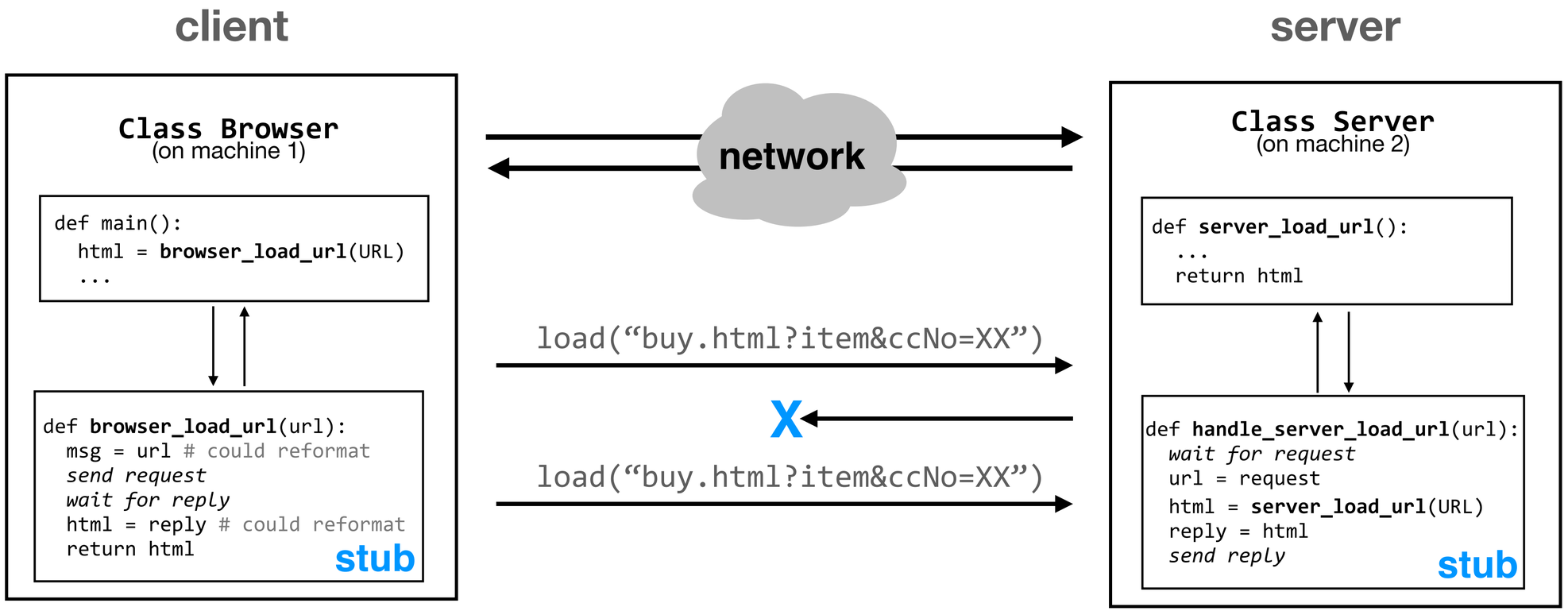
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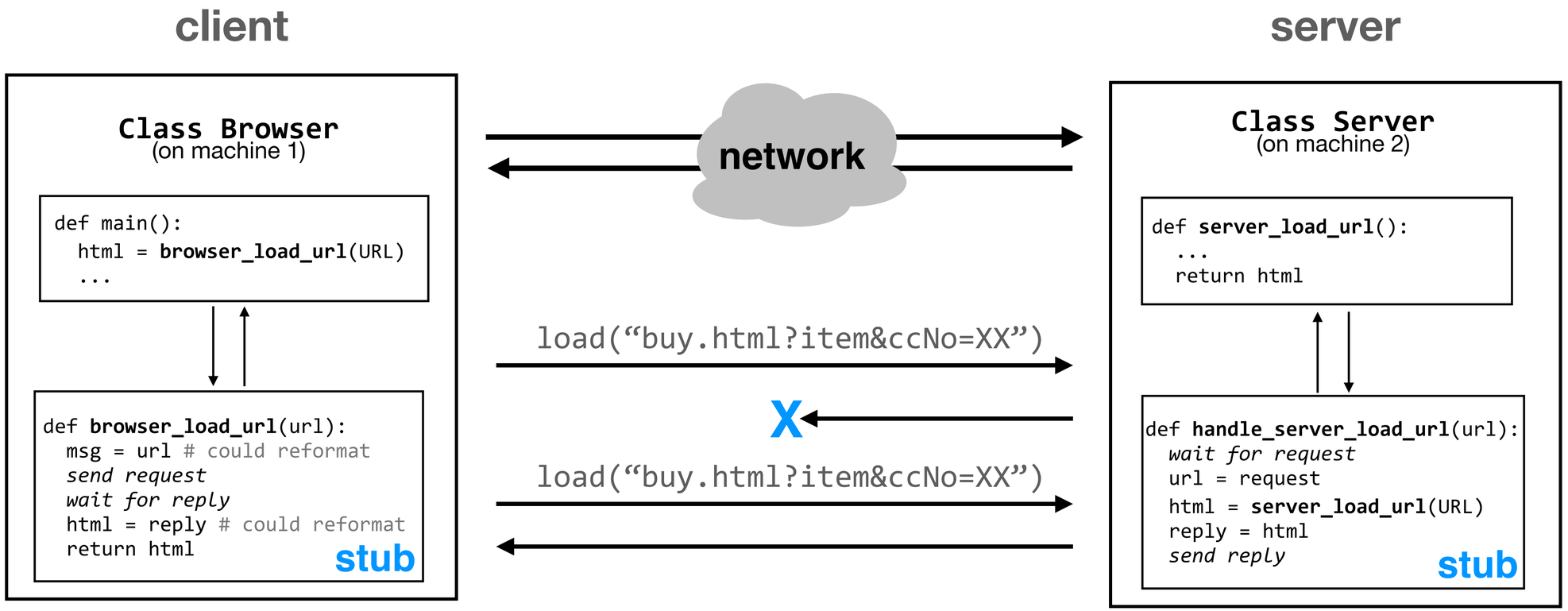
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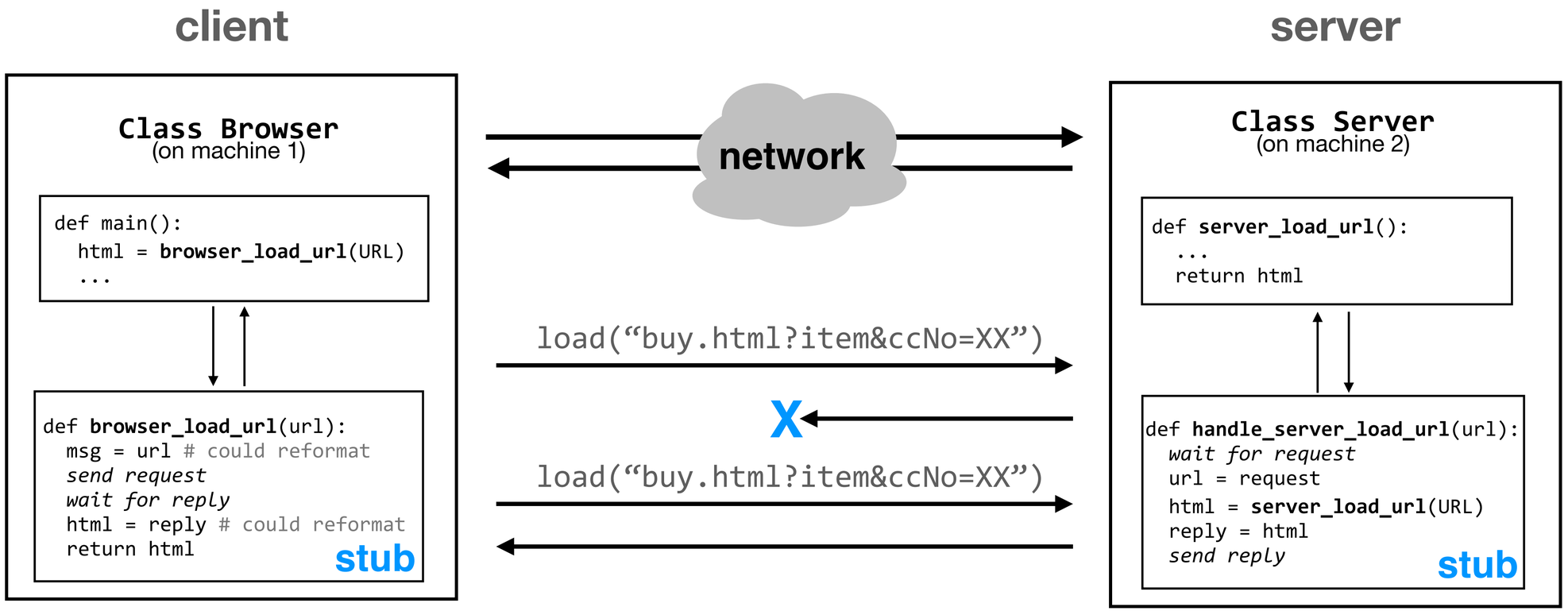
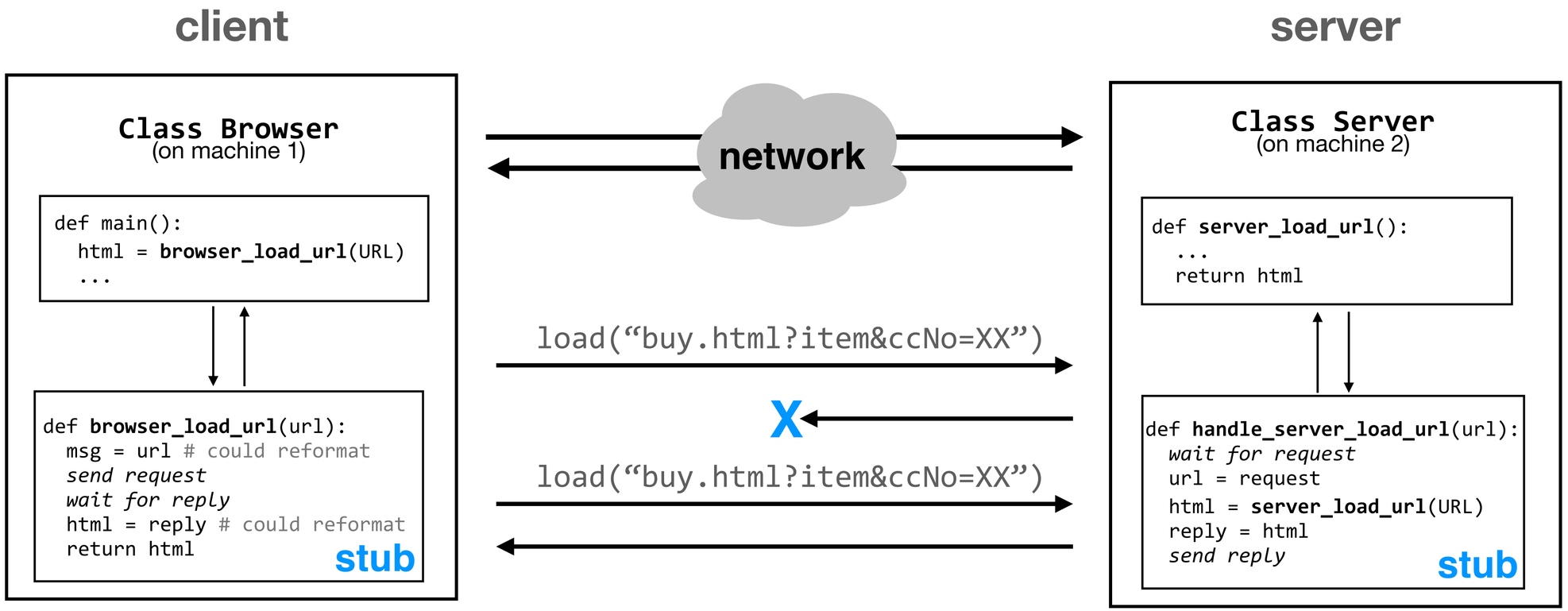


problem: we just bought two copies of `item`



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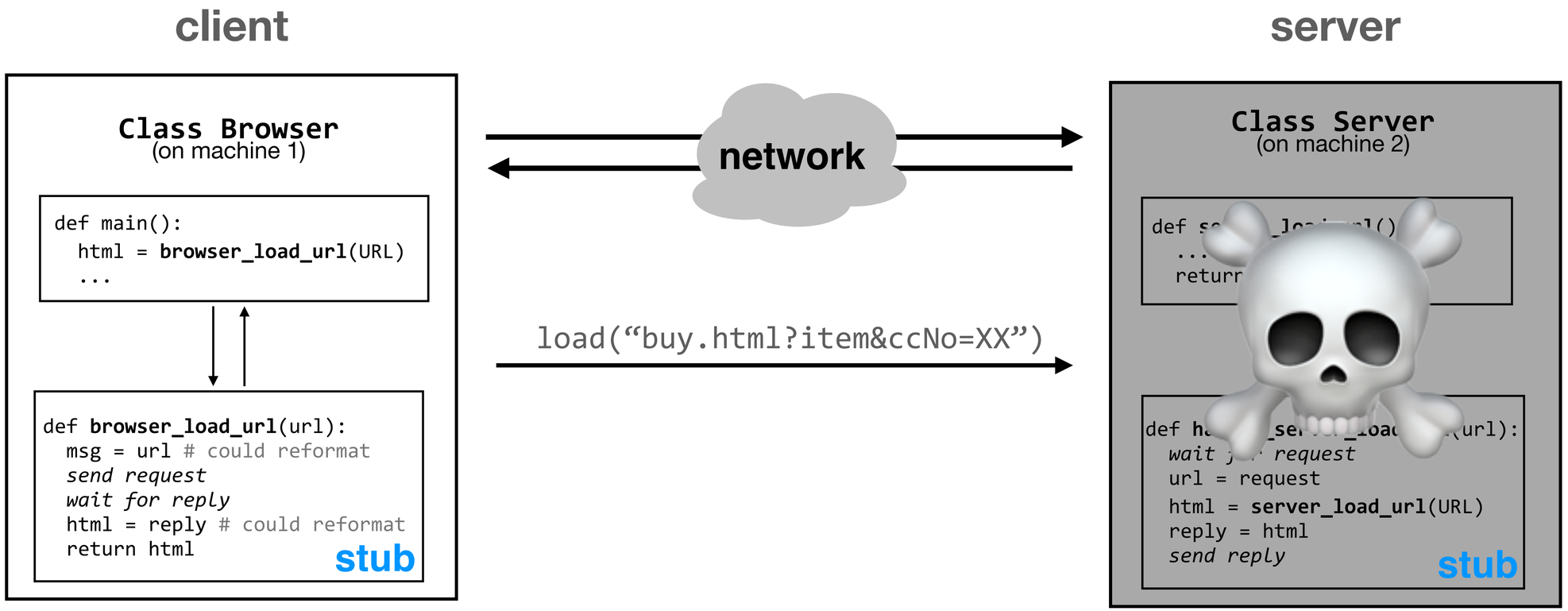

problem: we just bought two copies of `item`

there are ways to deal with this issue — for example, giving each request a unique ID, and keeping track of those IDs on the server — but then new problems arise: for example, what happens if the server crashes in the middle of handling a request?


client
network
server


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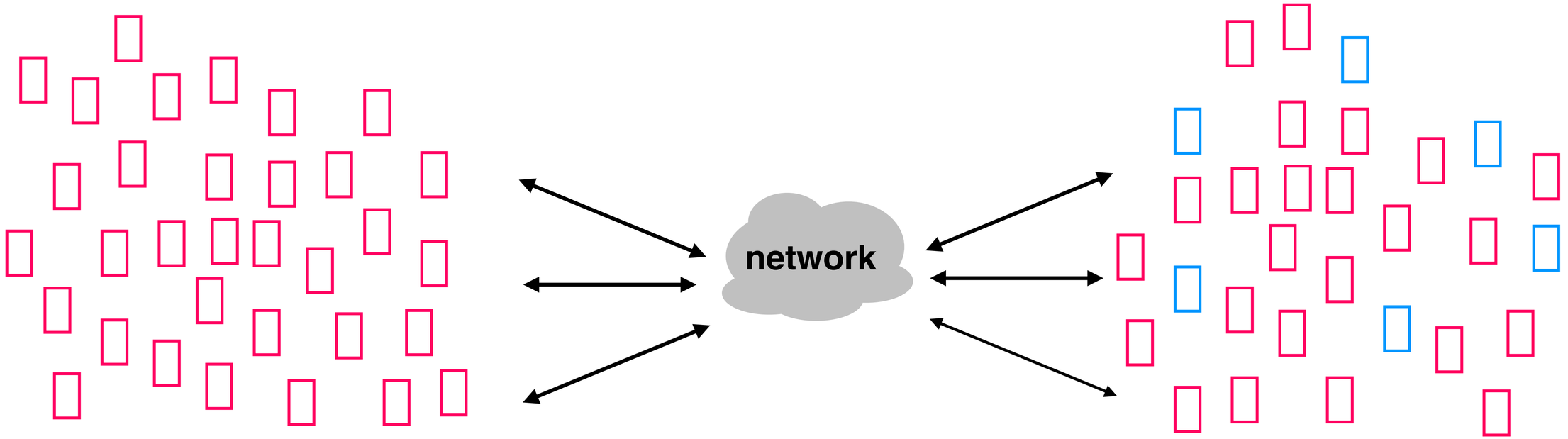
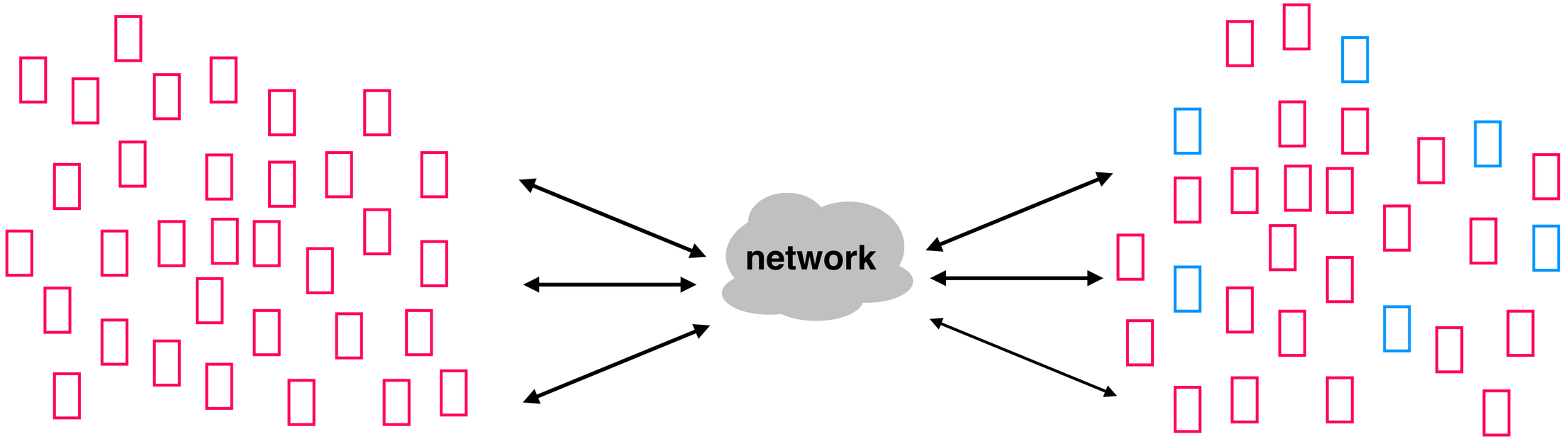

network

scalability: how does our system behave as we increase the number of machines, users, requests, data, etc.?



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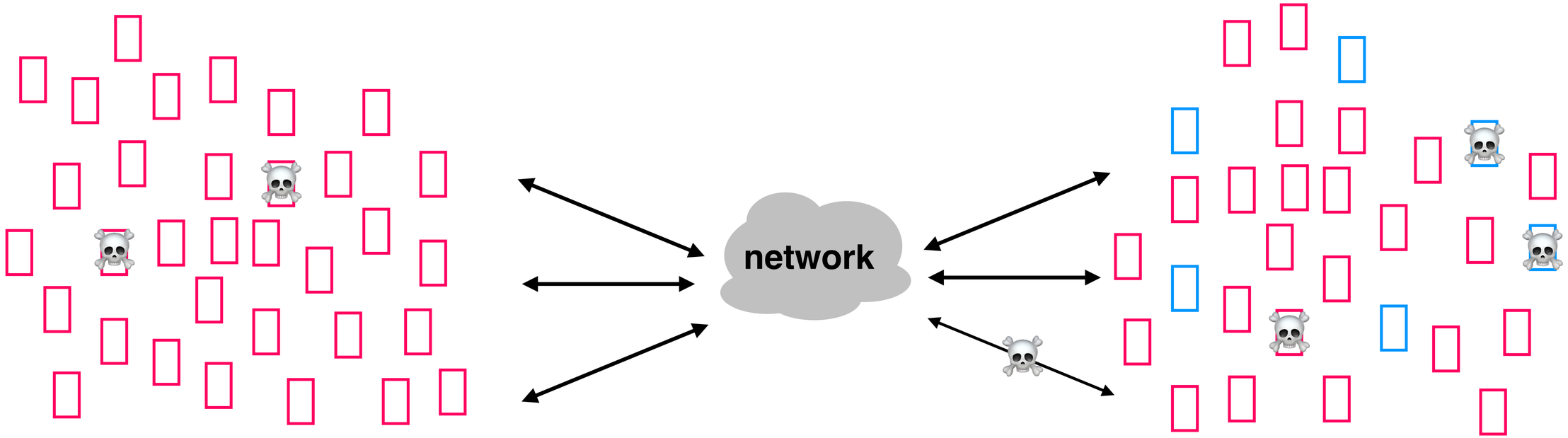

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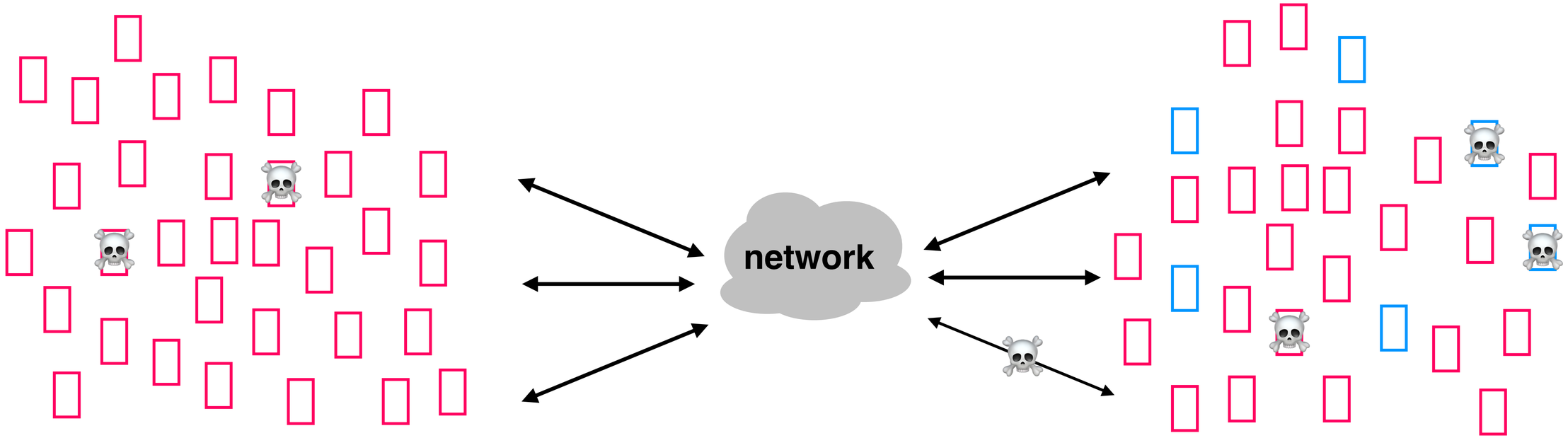
fault-tolerance/reliability: how does our system deal with failures (☠️)? machines crashing, network links breaking, etc.



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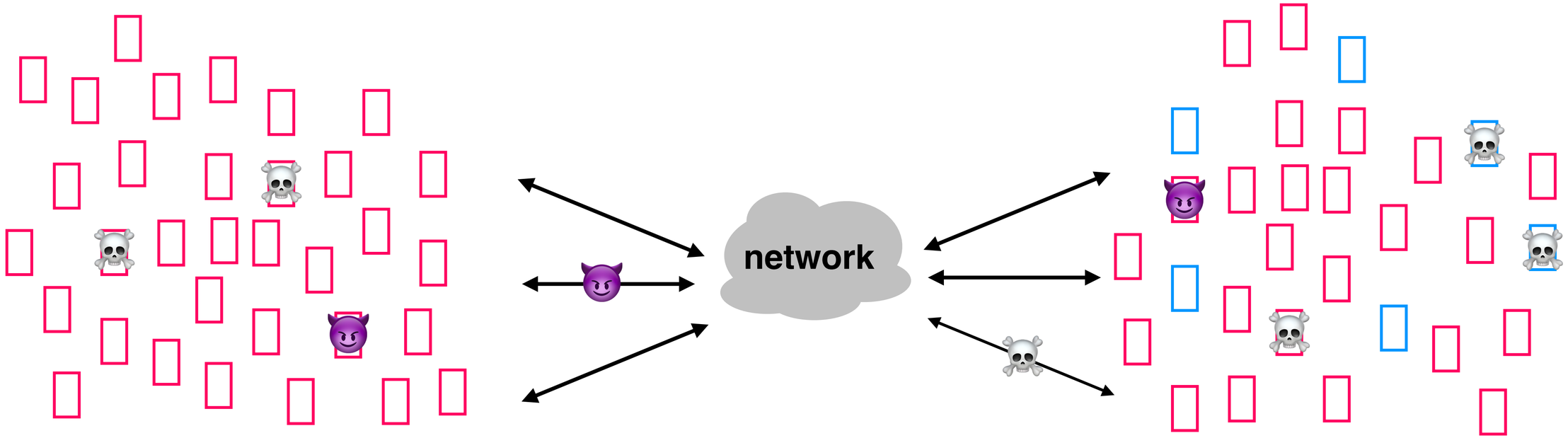

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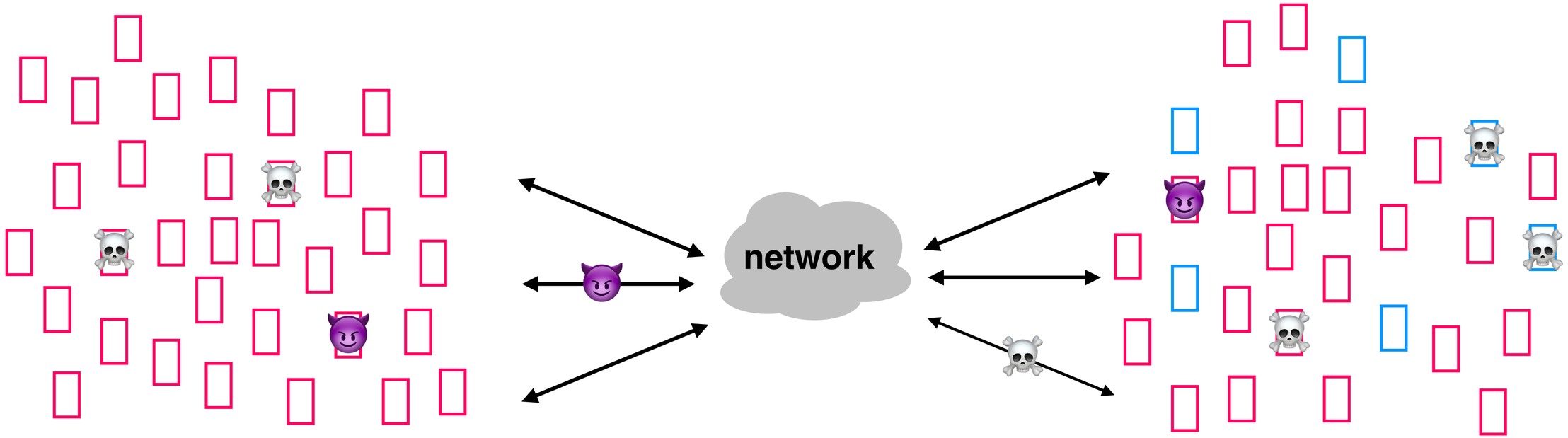

security: how does our system cope in the face of targeted attacks (😈)?

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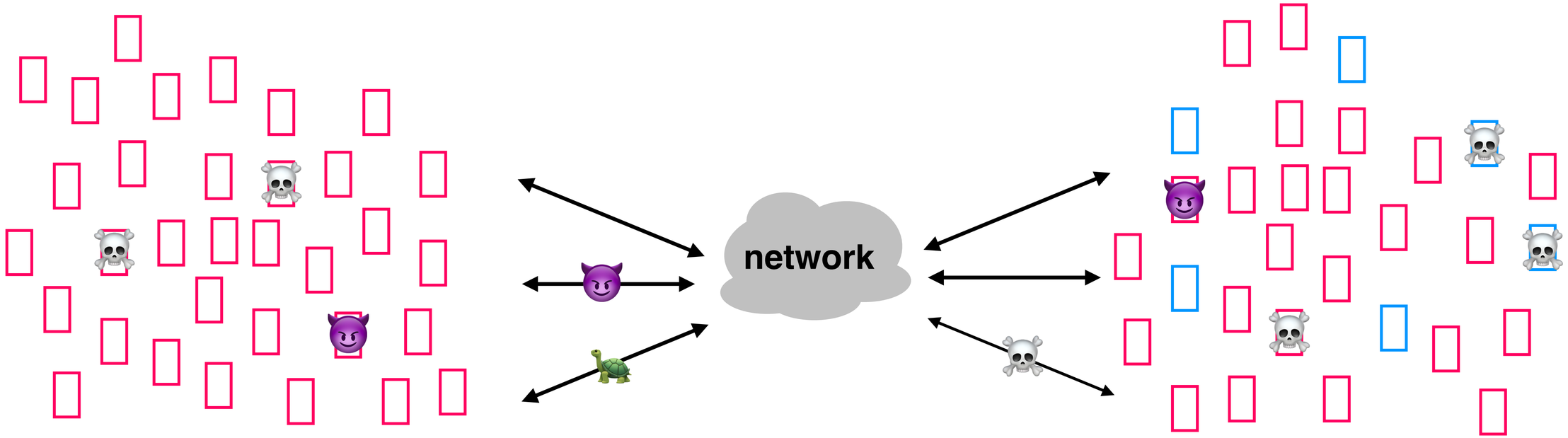

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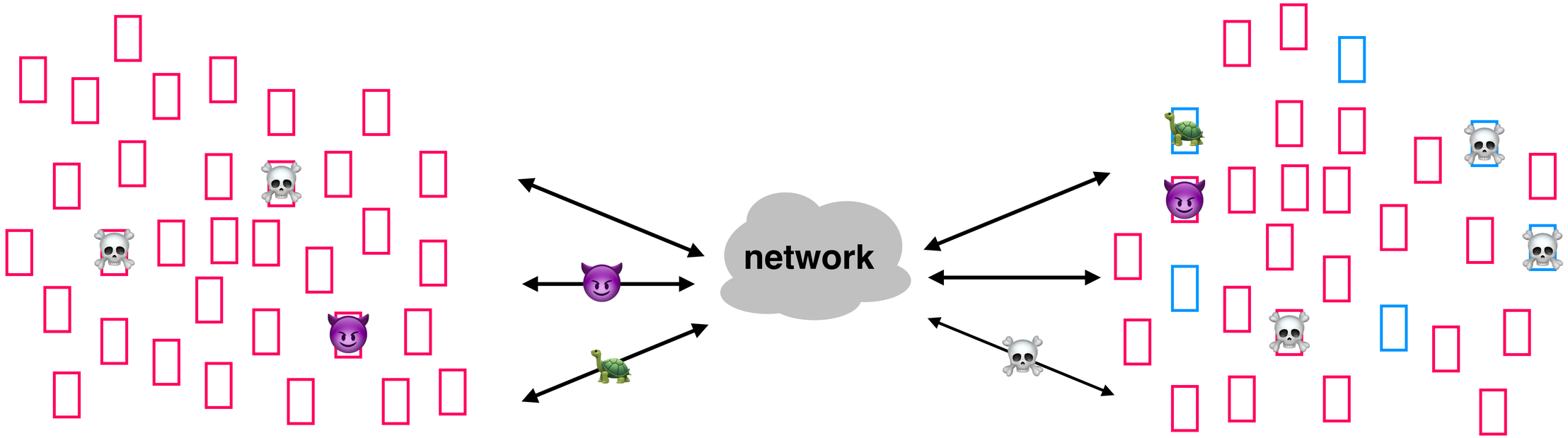

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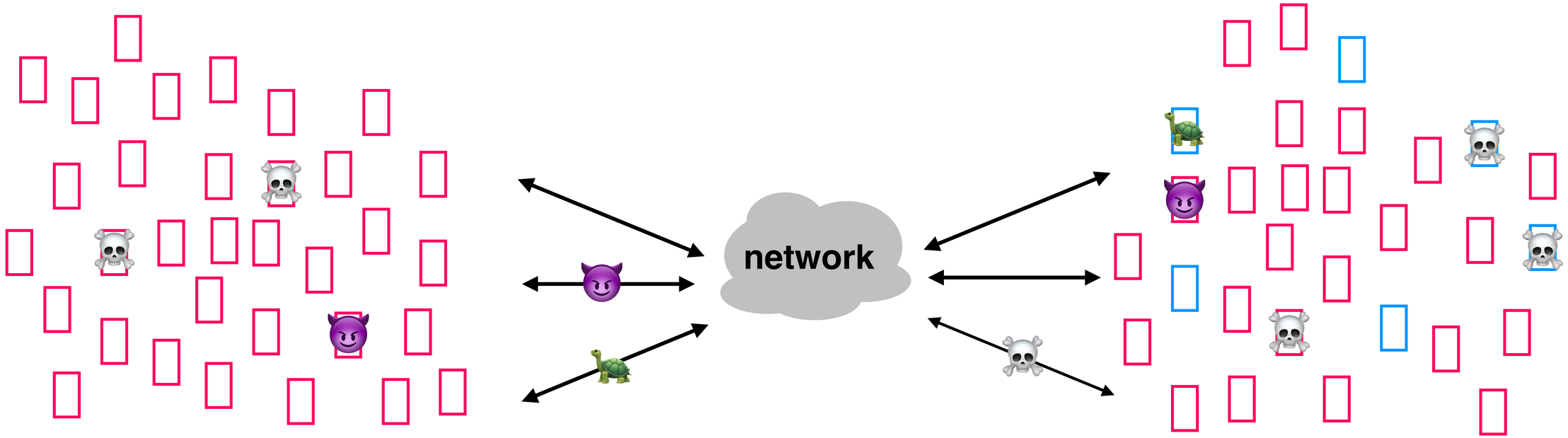
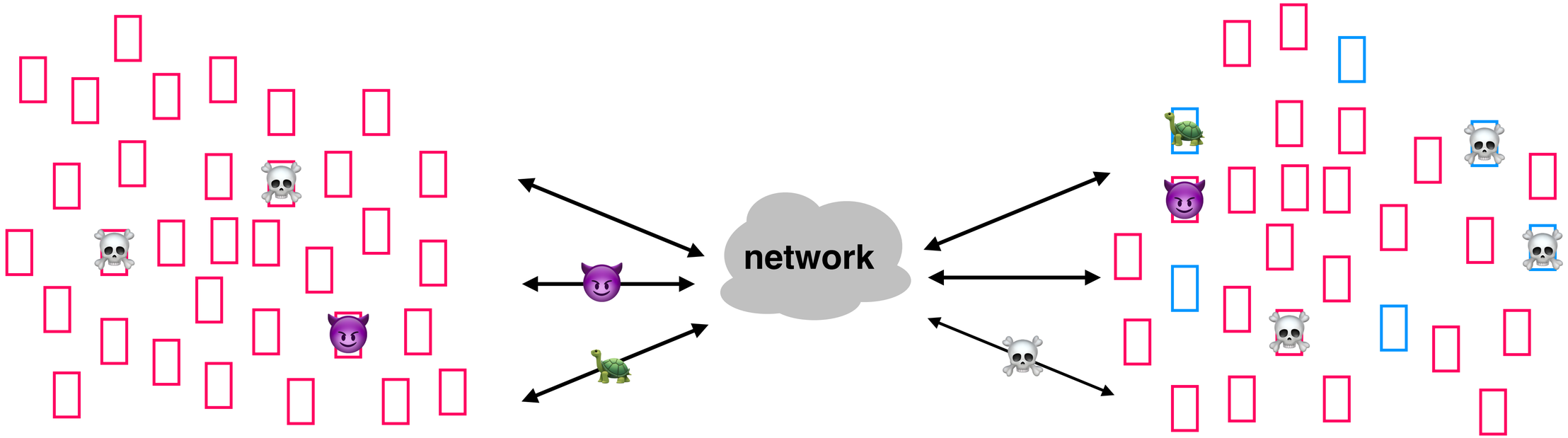


security: how does our system cope in the face of targeted attacks (😈)?

performance: how do we define our performance requirements, and know if our system is meeting them? what do we do if performance is subpar (🐢)?

scalability: how does our system behave as we increase the number of machines, users, requests, data, etc.?

fault-tolerance/reliability: how does our system deal with failures (☠️)? machines crashing, network links breaking, etc.



security: how does our system cope in the face of targeted attacks (😈)?

performance: how do we define our performance requirements, and know if our system is meeting them? what do we do if performance is subpar (🐢)?

who is impacted by our design and implementation choices?
who makes those choices?

http://mit.edu/6.1800

has all of the class material, due dates, deadlines, etc.

Monday	Tuesday	Wednesday	Thursday	Friday
feb 5 **LEC 1:** Modularity, Abstraction, and the Impact of Systems *First day of classes*	feb 6 **REC 1:** We Did Nothing Wrong	feb 7 **LEC 2:** Naming	feb 8 **REC 2:** DNS **Assignment Available**: Hands-on DNS	feb 9 **TUT 1:** Intro to 6.1800 Communication

http://mit.edu/6.1800

has all of the class material, due dates, deadlines, etc.

we've already sent out one announcement about a scheduling form — please fill it out today if you haven't already!

Canvas

for submitting assignments and seeing your grades, and the occasional class-wide (or section-wide) announcement. everything on Canvas will be linked from the class website

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we care about you as people more than we care about any deadline

if you need help, ask for it. we need to balance the needs of a large group of students and the needs of the staff, but we will work with you to help as much as we can. in particular, **as long as you reach out to your TA ahead of time, we will give you a 24-hour extension on any assignment, no questions asked.**

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you will see these principles applied over and over in this class

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after that: operating systems, which enforce modularity on a single machine