Block 1 – Client Server Interaction

Maaike van Putten
Software developer & trainer
www.brightboost.nl

Day 4: PRG, validation & error handling

Overview

D

HTTP & HTML FORMS

P

State management

Z

AJAX & refresh components

PRG, validation & error handling

What we'll cover today

- Understanding idempotent operations
- The POST-Redirect-GET pattern
- AJAX returning HTML
- Form validation strategies
- Error handling in production
- Real-world edge cases

Understanding idempotent operations

(Recap)

What is idempotency?

An operation is **idempotent** if performing it multiple times has the **same effect** as performing it once.

Idempotency

T

Not about the same response

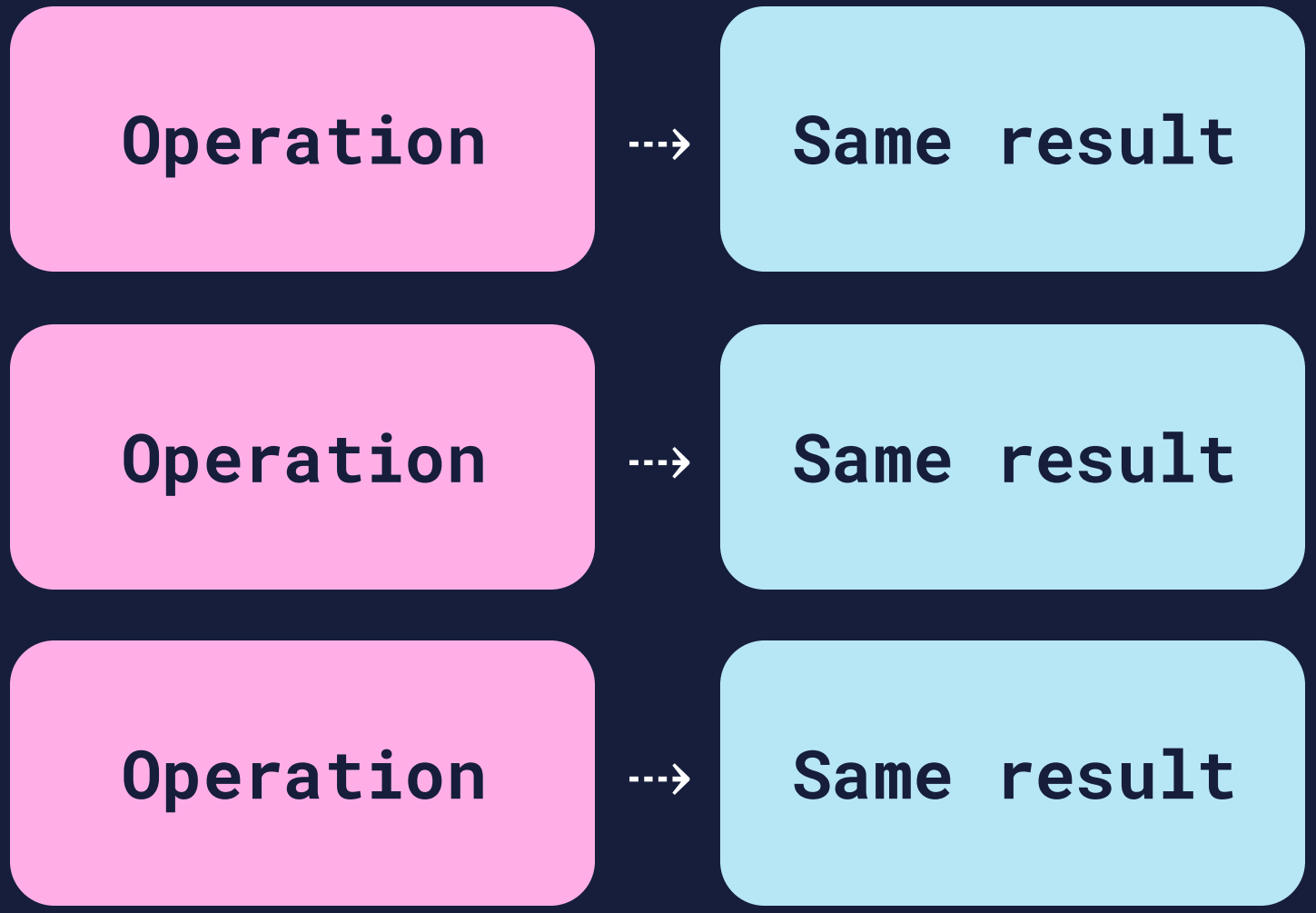
S

About the same effect on the system

e

Math example: x × 1 = x (no matter how many times)

Idempotency



HTTP methods: which are idempotent?

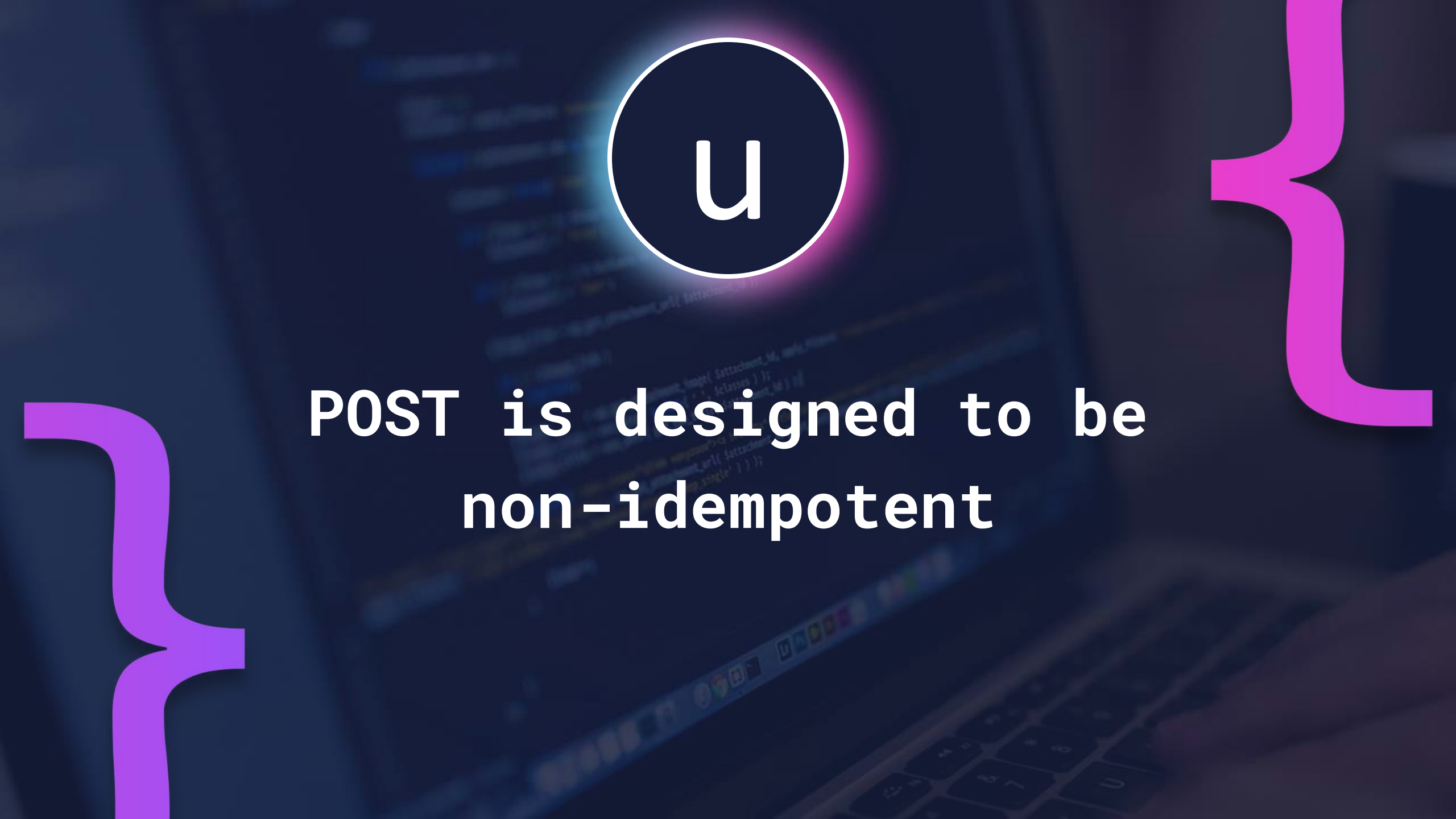
Idempotent methods

- ✓ **GET /products**
  Read data (safe + idempotent)
- ✓ **PUT /product/123**
  Set product 123 to state X
- ✓ **DELETE /product/123**
  Remove product 123

Not idempotent

- × **POST /order**
  Each call reates a new order
- × **POST /cart/add**
  Each call adds another item
- × **POST /counter/increment**
  Each call increments counter

What stands out here if we compare the left and right column?


u
POST is designed to be
non-idempotent

Idempotency in action: banking

Idempotent op

"Set account bala

Do it on
Balance =

Do it 5 times
Balance = €1

Non-idempotent operation

"Deposit €100"

Do it once:
Balance = starting + €100

Do it 5 times:
Balance = starting + €500

Idempotency in e-commerce

Scenario 1: Idempotent

Operation: "Set quantity of item X to 3"

Result after 1x: Quantity = 3

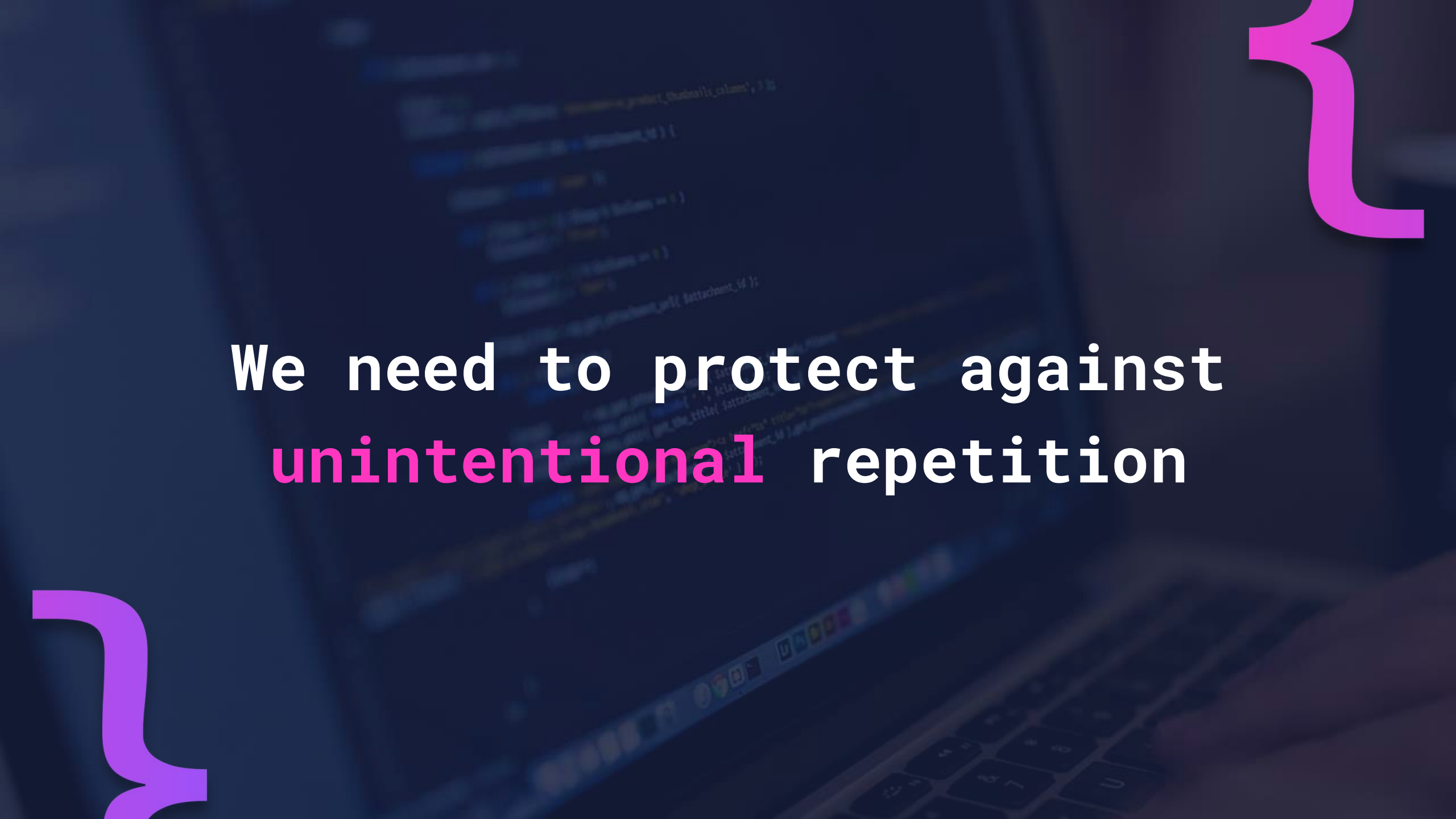
Result after 10x: Quantity = 3

Scenario 2: Non-idempotent

Operation: "Add 1 item X to cart"

Result after 1x: 1 item in cart

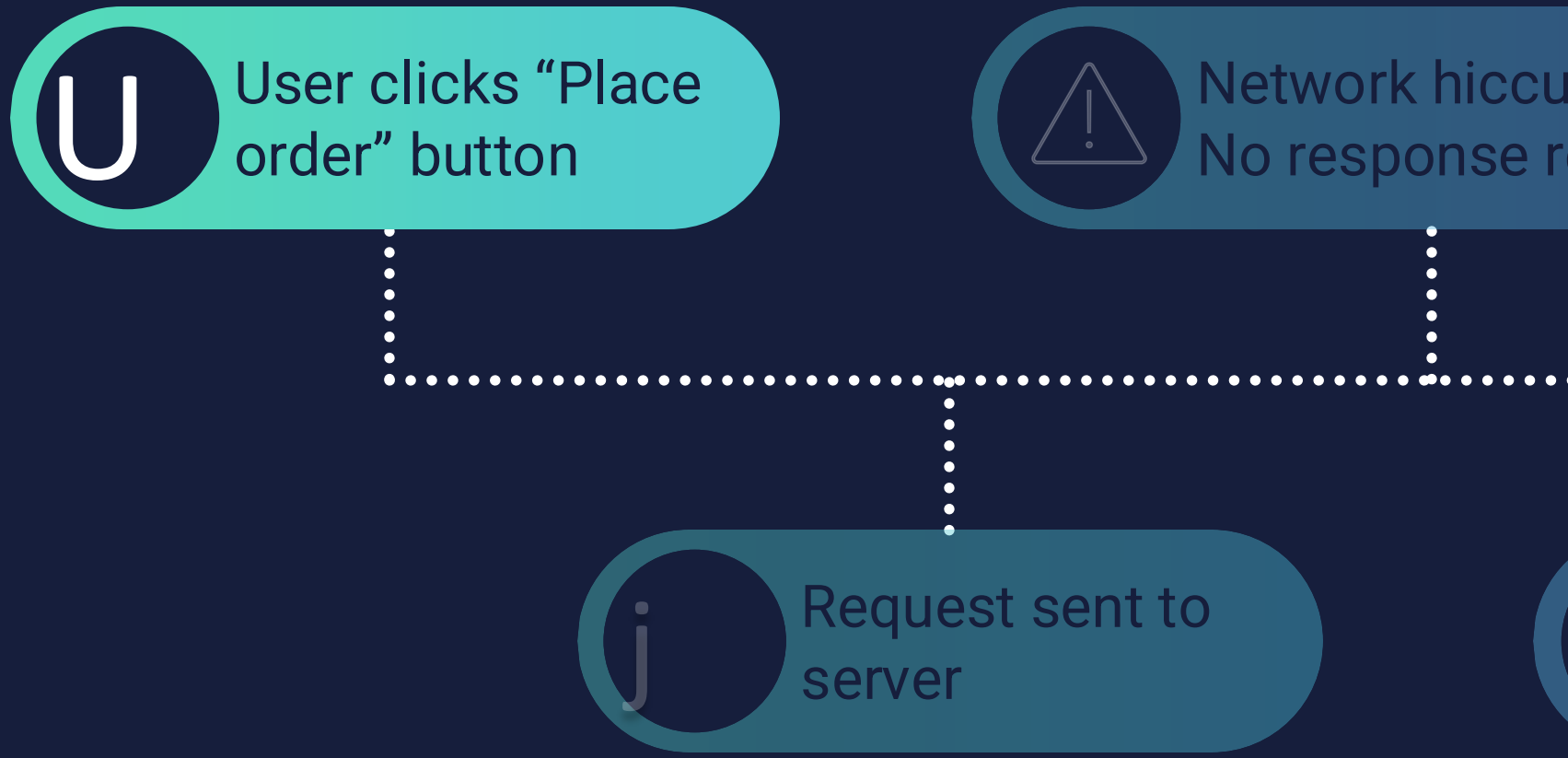
Result after 10x: 10 items in cart!


We need to protect against
unintentional repetition

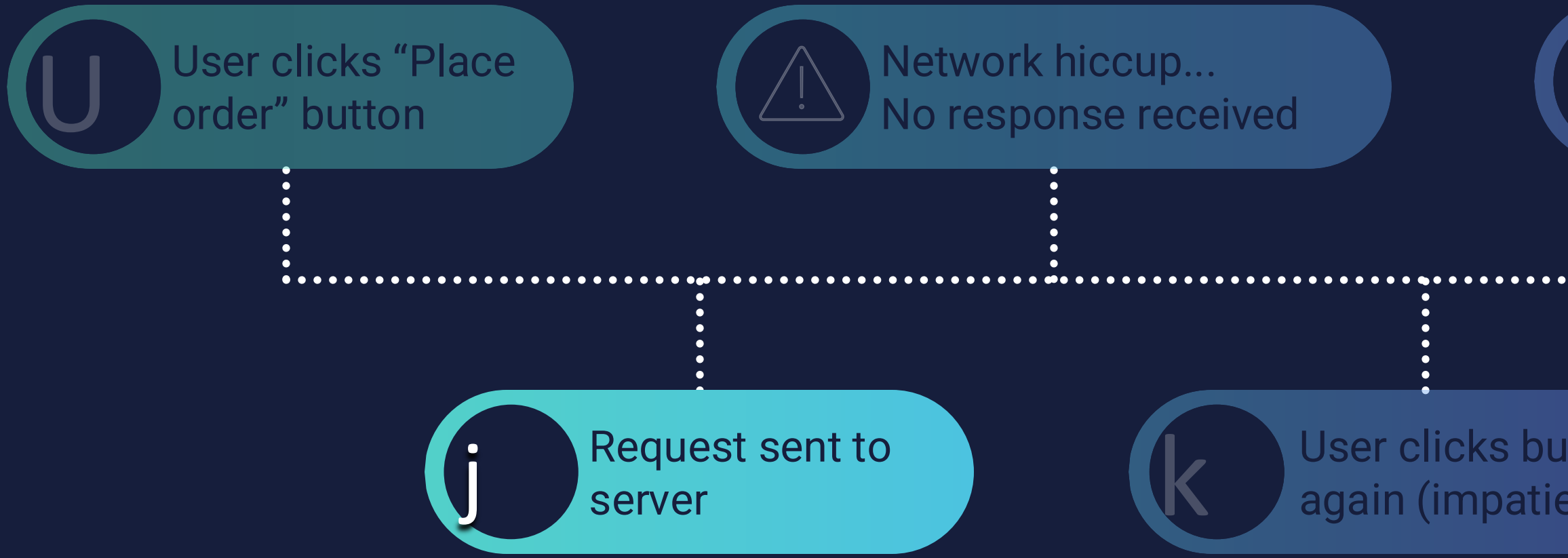
The reality of HTTP communication

- Networks are unreliable (timeouts, dropped packets)
- Users are impatient (double-clicks, rapid refreshes)
- Browsers retry failed requests automatically
- Mobile connections drop and reconnect

The scenario



The scenario



The scenario

User clicks “Place order” button

Network hiccup...
No response received

j

Second requ sent

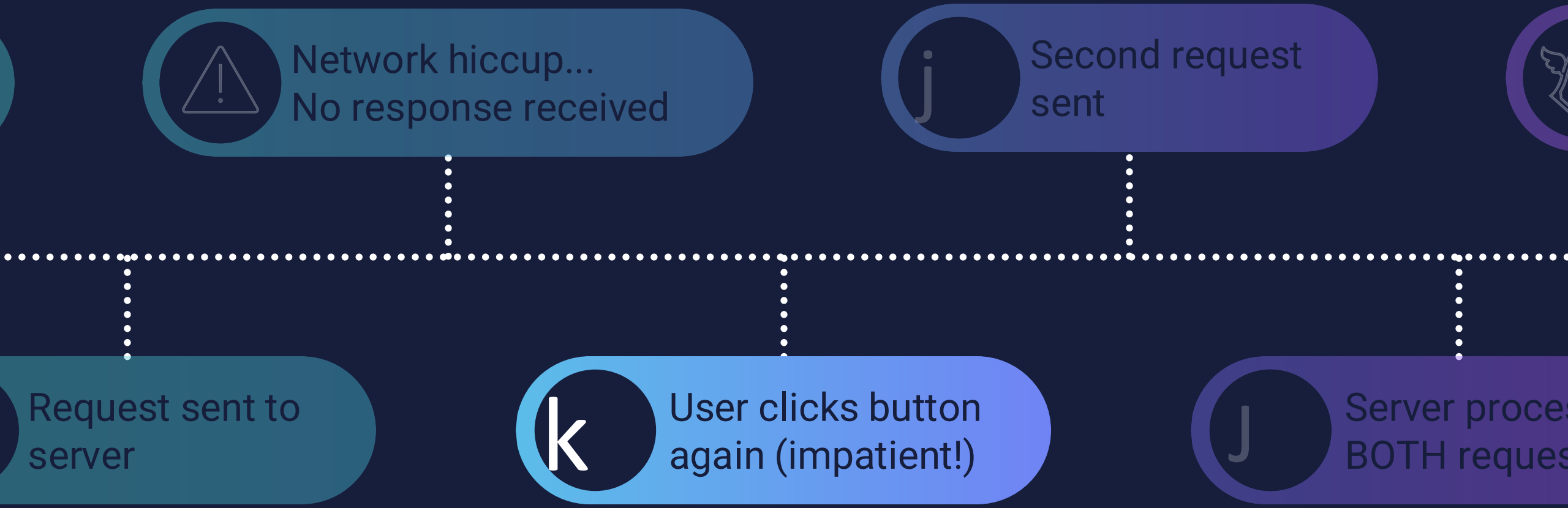
j

Request sent to server

k

User clicks button again (impatient!)

The scenario



The scenario

twork hiccup...
response received

j Second request sent


Result: User charged twice!

k User clicks button again (impatient!)

J Server processes BOTH requests

The scenario

User clicks button again (impatient!)

Second request sent

Server processes BOTH requests

Result: User charged twice!

The scenario

Second request sent

Result: User charged twice!

J

Server processes BOTH requests

Why POST is special

By design:

- POST is **specifically designed** to be non-idempotent
- Creating resources SHOULD generate new ones each time
- This is correct behavior for the HTTP specification

The problem:

- Not POST itself, but **accidental repetition**


How do we prevent unintentional duplicate submissions?

The POST-Redirect-GET pattern

Solving the double submit problem

Traditional approach (the wrong way)

Simple HTML form

```
<form action="/order" method="post">
  <input type="text" name="item" value="burger" />
  <button>Place Order</button>
</form>
```

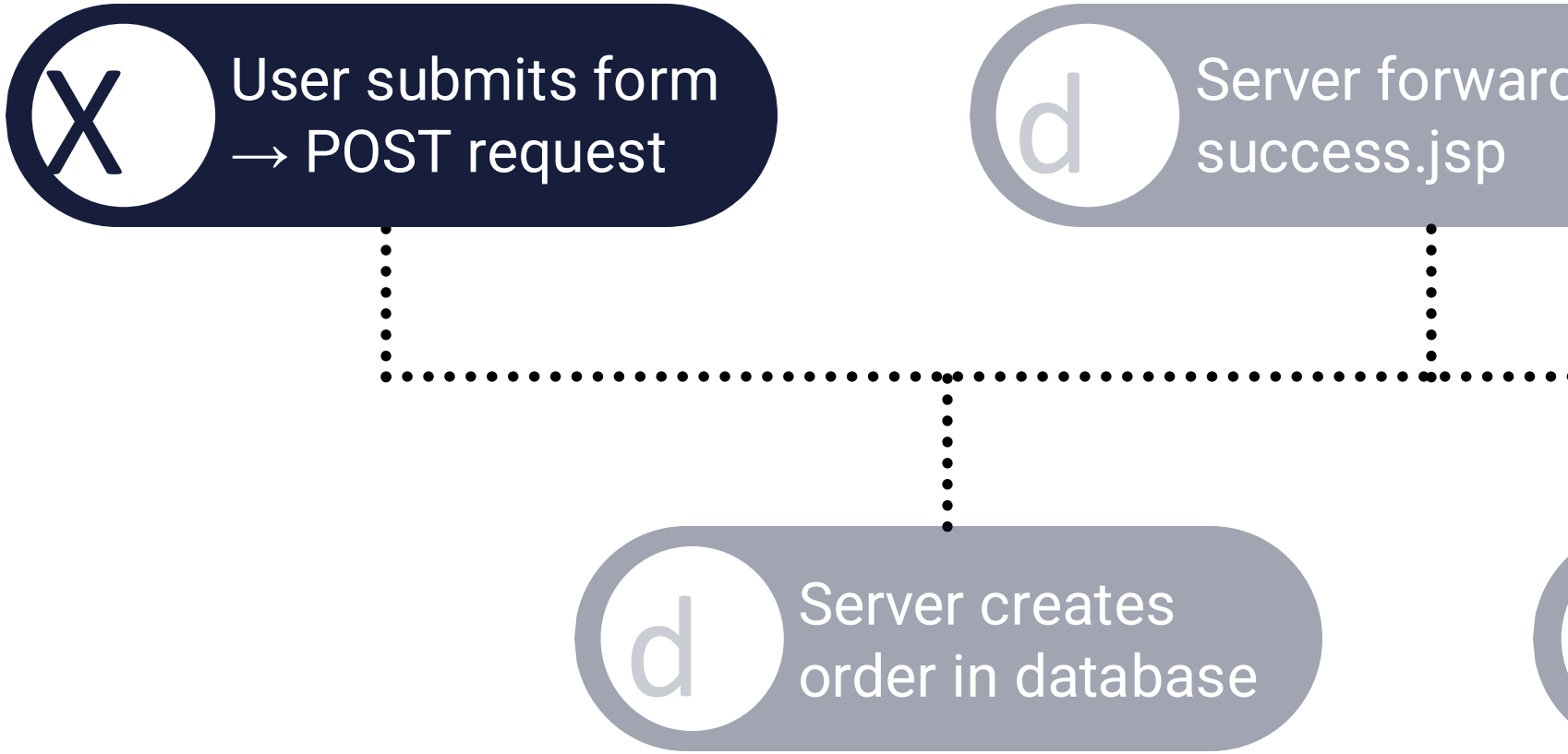
Traditional approach (the wrong way)

Servlet code (wrong)

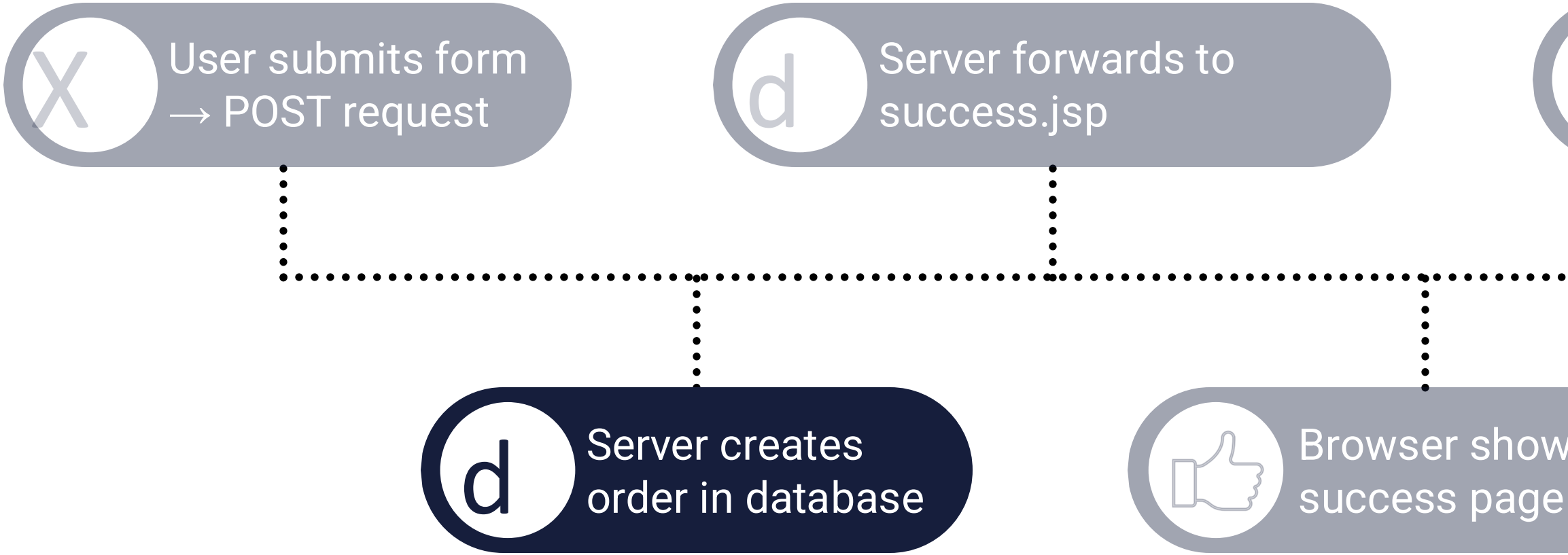
```
protected void doPost(...) {
    // 1. Process the order
    String item = request.getParameter("item");
    Order order = orderService.createOrder(item);

    // 2. Show success page directly: PROBLEM!
    request.getRequestDispatcher("/success.jsp")
           .forward(request, response);
}
```

Let’s see what goes wrong...

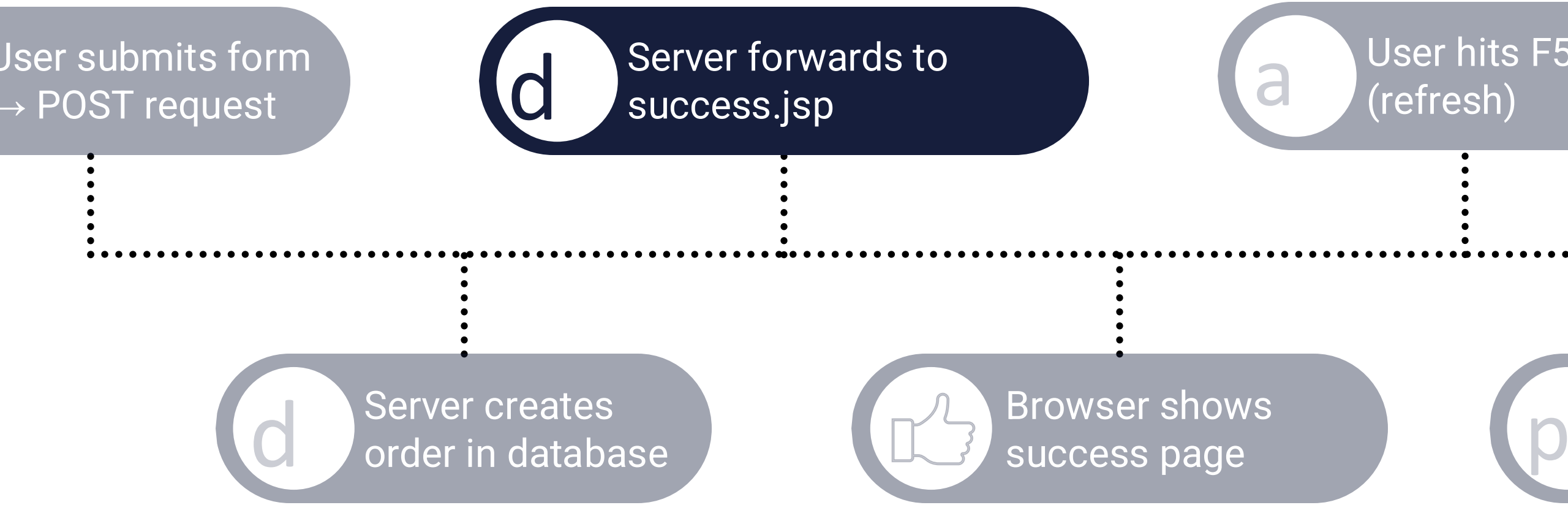
The double submit problem



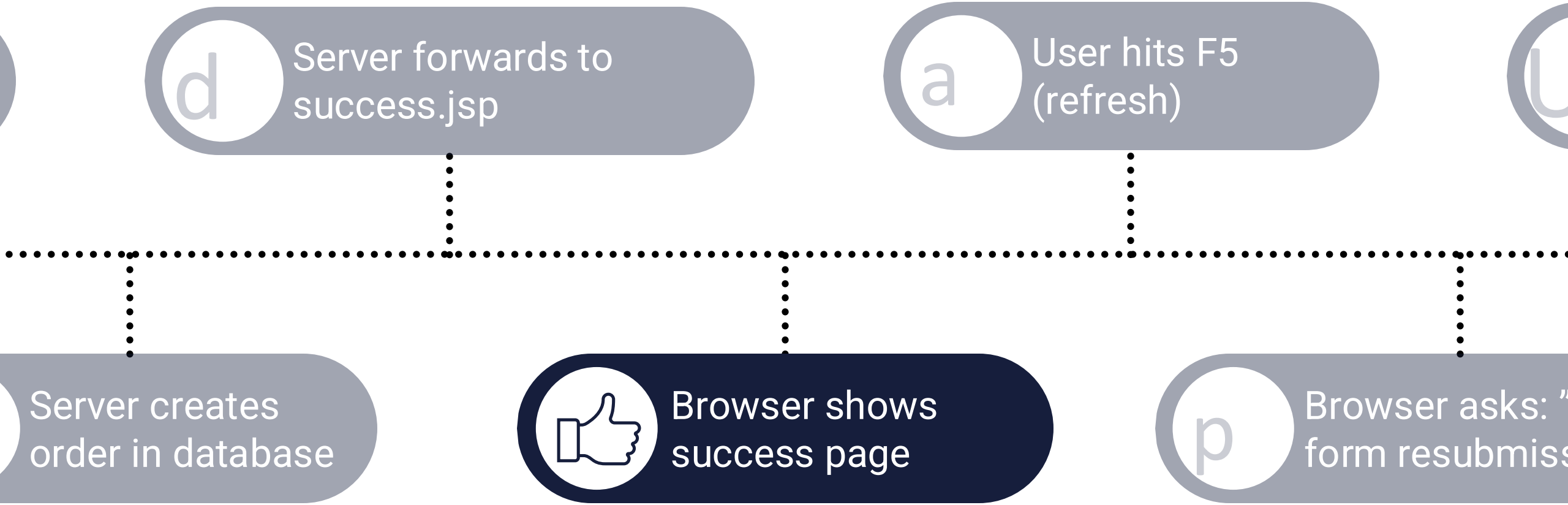
The double submit problem



The double submit problem



The double submit problem



The double submit problem

rver forwards to
ccess.jsp

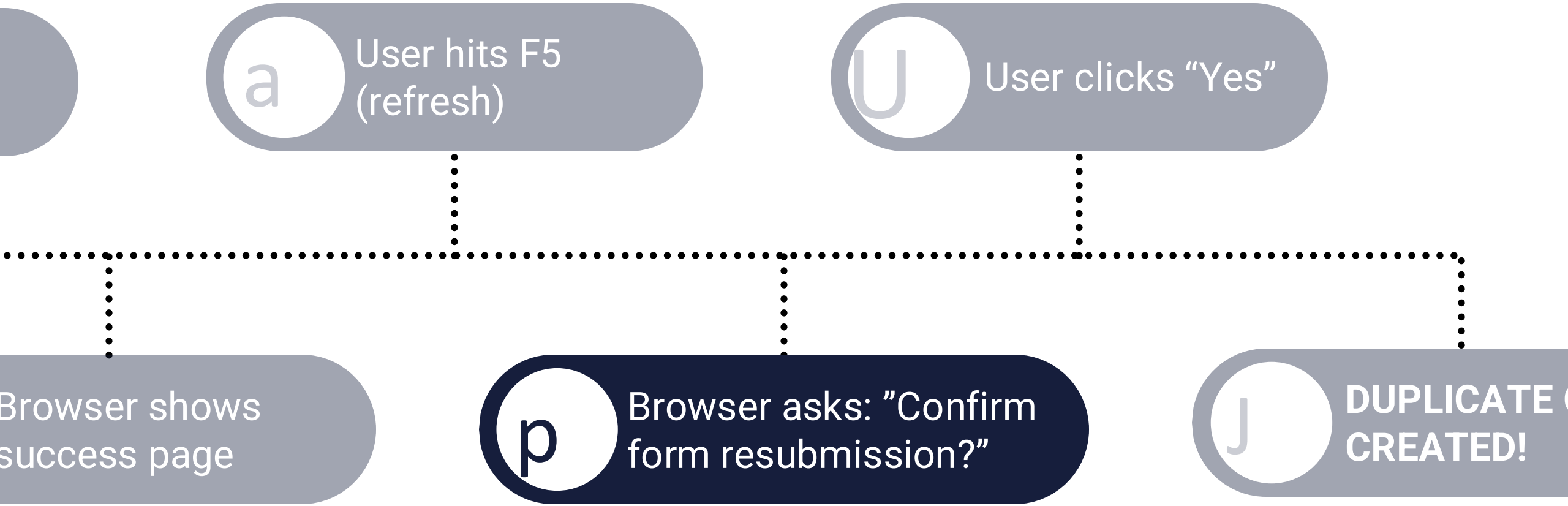
a User hits F5
(refresh)

U User clicks “Ye

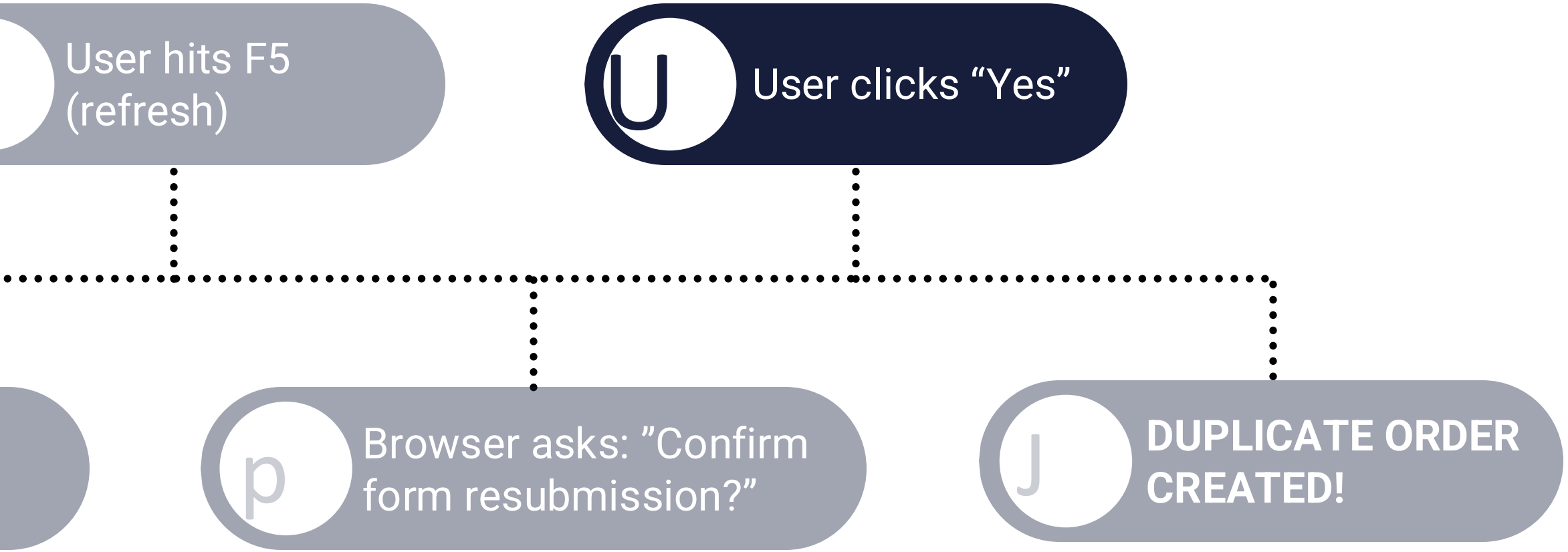
Browser shows
success page

p Browser asks: ”Confirm
form resubmission?”

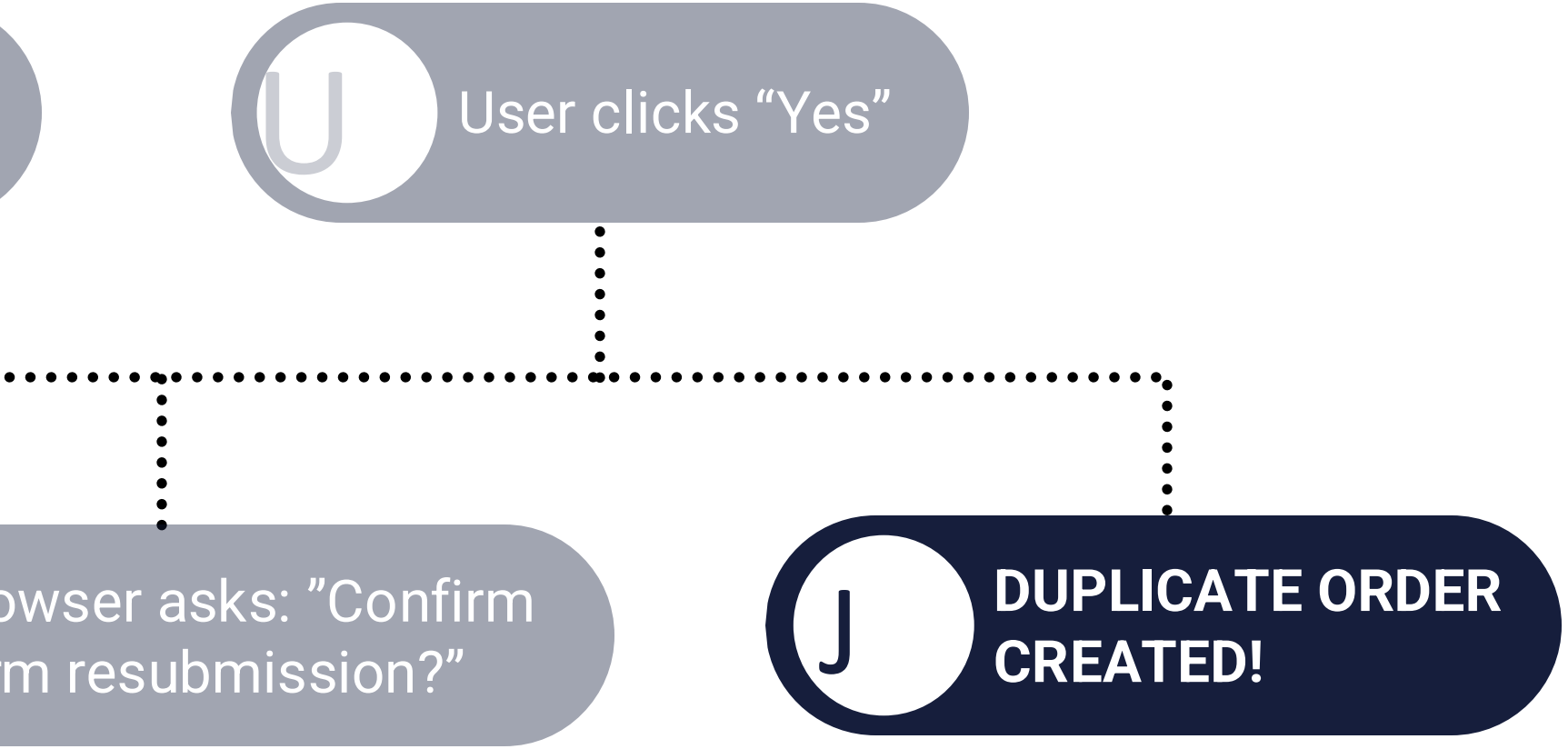
The double submit problem



The double submit problem



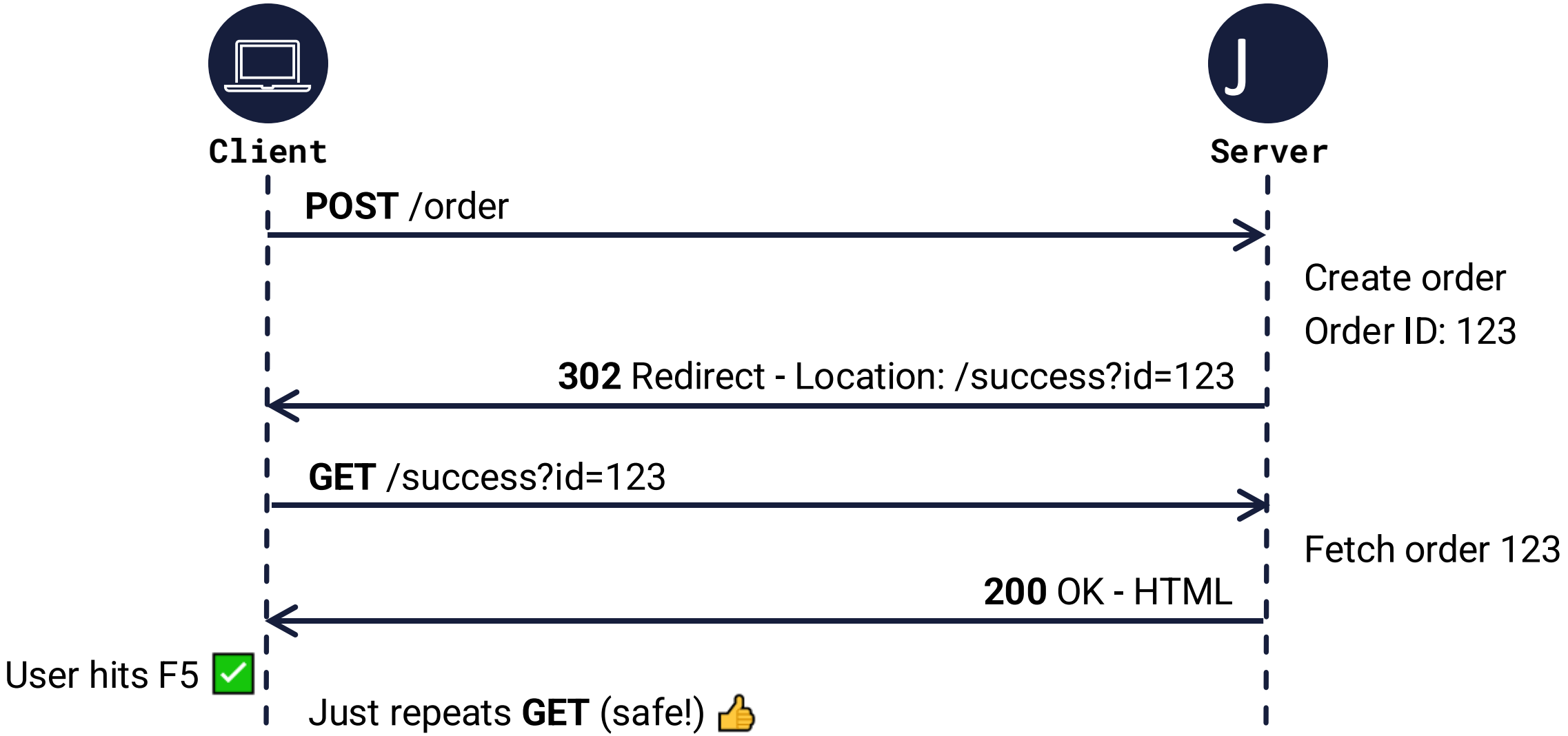
The double submit problem



Why this happens

- Browser remembers last action was a POST
- Refresh means “repeat last action”
- Browser warns user, but can’t prevent it

The solution: POST-Redirect-GET pattern



PRG pattern

- POST does the work
- Redirect separates action from display
- GET shows result (safe to repeat)

PRG pattern: three clear steps

D

POST does the work

```
protected void doPost(...) {
    // Extract and validate
    String item = request.getParameter("item");

    // THIS CHANGES THE DATABASE
    Order order = orderService.createOrder(item);

    // REDIRECT Don't render here!
    response.sendRedirect("/success?orderId=" + order.getId());
}
```

p

R

-
-
-

PRG pattern: three clear steps

```
m");

item);

=" + order.getId());
```

p

Redirect separates

- HTTP 302/303 status code
- Browser automatically follows
- URL changes in address bar

D

GET shows r

```
protected void do
    Long orderId
    Order order =
    // Forward to
}
```

PRG pattern: three clear steps

D

GET shows result

```
protected void doGet(...) {
    Long orderId = Long.parseLong(request.getParameter("orderId"));
    Order order = orderService.getOrder(orderId);
    // Forward to another page (read-only, safe)
}
```

What actually gets sent

POST request

```
POST /order HTTP/1.1
Host: localhost:8080
Content-Type: application/x-www-form-urlencoded


item=burger&quantity=2
```

Browser automatically follows the redirect

Redirect response

```
HTTP/1.1 302 Found
Location: /success?orderId=123
Content-Length: 0
```

GET request (automatic)

```
GET /success?orderId=123 HTTP/1.1
Host: localhost:8080
```

How the browser behaves

Aspect	Without PRG ✕	With PRG ✓
Address bar	Shows **`/order`** (POST URL)	Shows **`/success?orderId=123`** (GET URL)
Refresh (F5)	“Confirm form resubmission?”	Just re-fetches GET (safe)
Back button	Confusing behavior	Clean, predictable navigation
Bookmark	Can’t bookmark POST	Shareable URL to success page
Browser history	Messy	Clean and logical

Demo 0, 1, 2

PRG

Exercise 0

Fix the double submit bug

Given:

Servlet that forwards after POST

Task:

Convert to PRG pattern

Time: 15 minutes

Common mistake: writing after redirect

```
response.sendRedirect("/success");
response.getWriter().println("Redirecting..."); // Won't work!
```

Why it fails

- `sendRedirect()` sets status 302 and Location header
- Browser immediately follows redirect
- Any output after is **ignored**
- May throw `IllegalStateException`

Correct code

```
response.sendRedirect("/success");
// NO CODE AFTER sendRedirect!
```

Rule

After redirect, return immediately.

Common mistake: forgetting URL encoding

```
// What if item has spaces or special characters?
response.sendRedirect("/success?item=" + item)
```

Problems

- **item = "John Doe"** >> Invalid URL (space)
- **item = "A&B"** >> Parsed as two parameters
- **item = "åäö"** >> Encoding errors

Correct code

```
String encodedItem = URLEncoder.encode(item, StandardCharsets.UTF_8);
response.sendRedirect("/success?item=" + encodedItem);
```

Result

"John Doe" >> "John+Doe" (valid URL)

Common mistake: passing too much data

```
response.sendRedirect("/success?item=" + item +
    "&quantity=" + quantity +
    "&price=" + price +
    "&customer=" + customer +
    "&address=" + address + ...);
// URL gets too long!
```

Problems

- URLs have length limits (2000 chars in some browsers)
- Hard to read and maintain
- Security concerns (sensitive data in URL)

Better approach

```
// Pass only ID, fetch details in GET handler
response.sendRedirect("/success?orderId=" + order.getId())
```

Common mistake: forward vs redirect

Forward

```
request.getRequestDispatcher("/success")
       .forward(request, response);
```

- Happens server-side
- URL doesn’t change
- Still has double-submit problem

Redirect

```
response.sendRedirect("/success");
```

- Browser makes new request
- URL changes
- Solves double submit-problem

When not to use PRG

Search forms: already using GET

Filters and sorting: Already using GET

Read-only operations: Already using GET

Always use PRG for

- Creating records (orders, users, posts)
- Updating records (profile edits, settings)
- Deleting records
- **Any operation that changes server state**

PRG pattern summary

J **Prevents double submission**
User can refresh safely

r **Clean browser history**
Back button works predictably

J **Bookmarkable URLs**
Success pages can be shared

F **Better user experience**
No “Confirm resubmission” dialogs

U **Industry standard**
Used by all major web frameworks


If POST changes data, always redirect to GET

AJAX returning HTML instead of JSON

Modern enhancement without full JSON API

AJAX can return different things

Approach A: return JSON

```
fetch("/api/cart/add")
  .then((response) => response.json())
  .then((data) => {
    // JavaScript builds HTML
    element.innerHTML = `
      <div>${data.itemName}</div>
      <div>€${data.price}</div>
    `;
  });
```

Problems

- HTML duplicated (server JSP + JS)
- Styling duplicated (CSS classes)
- Hart to maintain
- More JavaScript code

AJAX can return different things

Approach B: return HTML

```
fetch("/cart/add")
  .then((response) => response.text())
  .then((html) => {
    // Just insert - server did the work!
    element.innerHTML = html;
  });
```

Benefits

- Server keeps control of HTML
- Reuse existing JSP templates
- Consistent styling
- Less JavaScript

Why return HTML from server?

- ✓ **Single source of truth**
  - HTML structure defined once (in JSP)
  - No duplication between server and client
- ✓ **Consistent styling: same look everywhere**
  - CSS classes applied server-side
- ✓ **Easier maintenance**
  - Change layout --> Update only JSP (no need to update JS)
- ✓ **Less JavaScript code**
  - Simple insertion, no templating logic
  - Fewer bugs to debug
- ✓ **Works for both**
  - Same endpoint serves traditional and AJAX requests
  - Progressive enhancement

Demo 3

Partial updates without JSON

Exercise 1

Add AJAX enhancement

Given:

Working traditional form with PRG

Task:
Form that works with AND without JavaScript

Time: 20 minutes

Best practice: progressive enhancement

Start with working HTML/forms, add AJAX on top

Step 1: HTML that works without JavaScript

```
<form action="/cart/add" method="post" id="cart-form">
  <input type="hidden" name="itemId" value="123" />
  <button type="submit">Add to Cart</button>
</form>
```

S

```
if
  /
  f
  }
}
```

Best practice: progressive enhancement

Start with working HTML/forms, add AJAX on top

Script

Step 2: Enhance with JavaScript

```
if (window.fetch) {
  // Check if AJAX available
  form.addEventListener("submit", function (e) {
    e.preventDefault(); // Stop normal submission
    // Try AJAX...
    // If fails, fall back: this.submit();
  });
}
```

Benef

- ✓ Works
- ✓ Works
- ✓ Same s

Best practice: progressive enhancement

Start with working HTML/forms, add AJAX on top

```
.pt

  {
sion
```

Benefits

- ✓ Works without JavaScript (accessibility!)
- ✓ Works with JavaScript (better UX!)
- ✓ Same server code handles both

Behind the scenes: HTTP messages

Scenario 1: Traditional request (no JS)

```
POST /cart/add HTTP/1.1
(no X-Requested-With header)
```

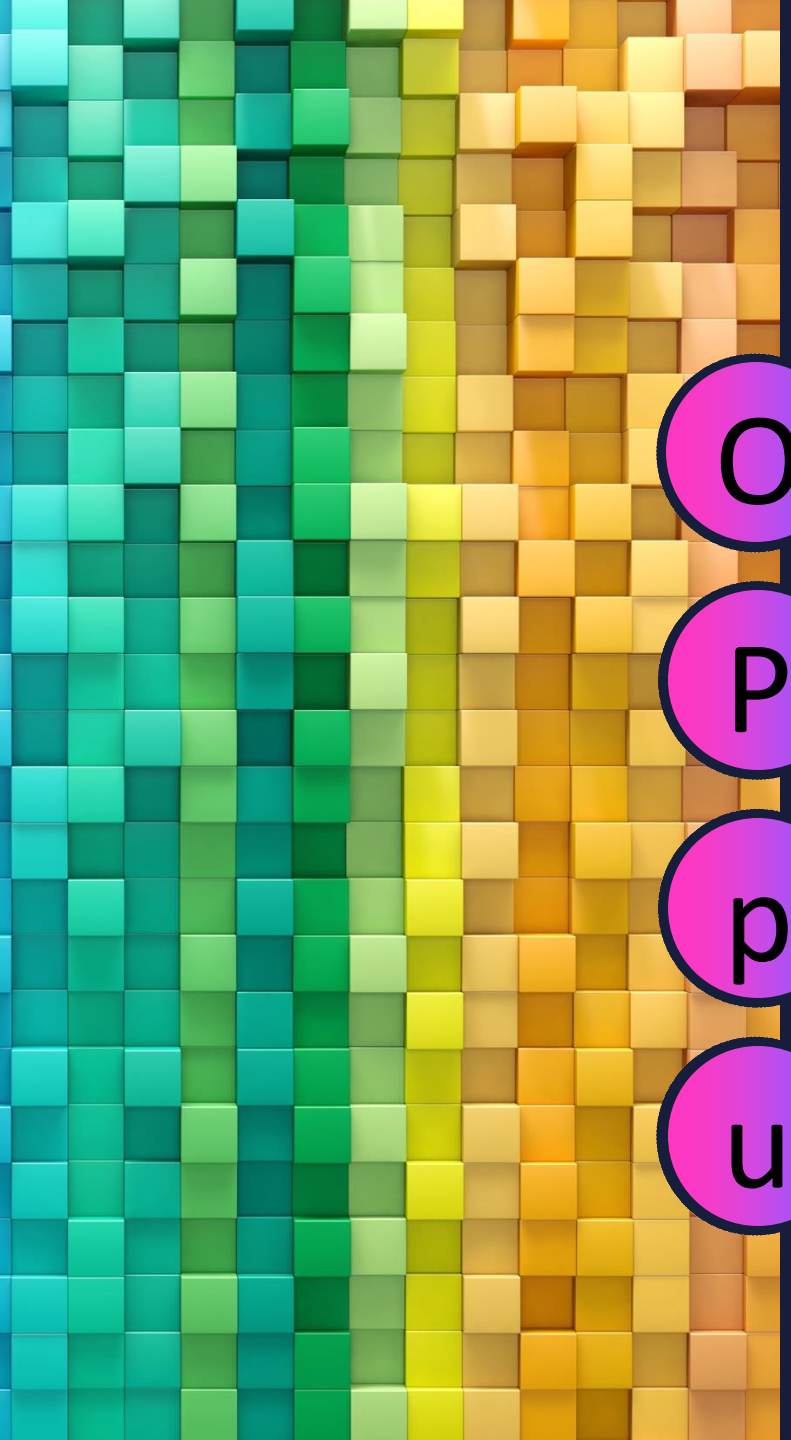
> Server: Detects tradit
> Responds with 302 redi
> Browser follow to GET /cart
> Full page loads

Scenario 2: AJAX requests

```
add HTTP/1.1
With: XMLHttpRequest
```

> Server: Detects AJAX request
> Responds with 200 and HTML fragment
> JavaScript updates page
> No navigation, no reload

Same endpoint, different behavior based on header



Benefits of reusing fragments

- Same HTML structure everywhere
- Same CSS styling
- One place to maintain
- Consistent behavior

AJAX returning HTML summary

Server keeps control
HTML rendering stays server-side, business logic in one place

Reuse JSP templates
Create fragments once, use for full page and AJAX updates

Progressive enhancement
Works without JavaScript, enhanced with JavaScript

Less complexity
Less JavaScript code, fewer bugs to debug

Consistent design
Same CSS, same structure - One source of truth

When to use AJAX with HTML:

Server-rendered apps that want smooth partial updates

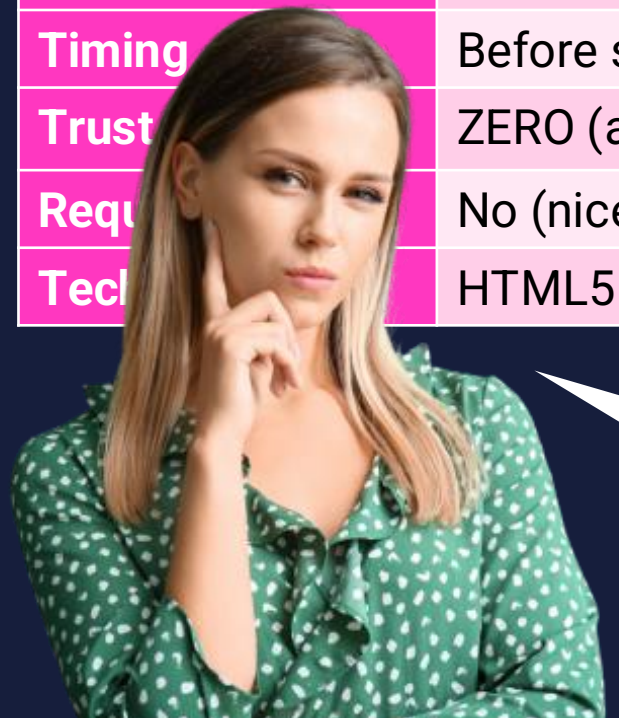
Form validation & error handling

Handling invalid input gracefully

Two types of validation

Client-side vs server-side validation

Aspect	Client-side	Server-side
Purpose	Quick feedback, better UX	Security, business rules
Timing	Before sending to server	After receiving request
Trust	ZERO (always bypass-able)	ABSOLUTE (only one that counts)
Requ	No (nice to have)	YES (mandatory)
Tech	HTML5 + JavaScript	Java servlet code



NEVER trust client-side validation alone!

Client-side validation: HTML5 built-in


```
<form action="/order" method="post">
  <input type="text" name="name" required />

  <input type="email" name="email" required />

  <input type="number" name="quantity" min="1" max="100" required />

  <input
    type="text"
    name="zipcode"
    pattern="[0-9]{4}[A-Z]{2}"
    title="Dutch zipcode (e.g., 1234AB)"
  />

  <input type="text" name="username" minlength="3" maxlength="20" required />
  <button type="submit">Order</button>
</form>
```

Required field

Client-side validation: HTML5 built-in


```
<form action="/order" method="post">
  <input type="text" name="name" required />

  <input type="email" name="email" required />
```

<- - - Email format

```
  <input type="number" name="quantity" min="1" max="100" required />

  <input
    type="text"
    name="zipcode"
    pattern="[0-9]{4}[A-Z]{2}"
    title="Dutch zipcode (e.g., 1234AB)"
  />

  <input type="text" name="username" minlength="3" maxlength="20" required />
  <button type="submit">Order</button>
</form>
```

Client-side validation: HTML5 built-in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<form action="/order" method="post">
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  <input
    type="text"
    name="zipcode"
    pattern="[0-9]{4}[A-Z]{2}"
    title="Dutch zipcode (e.g., 1234AB)"
  />

  <input type="text" name="username" minlength="3" maxlength="20" required />
  <button type="submit">Order</button>
</form>
```

Number with range

Client-side validation: HTML5 built-in


```
<form action="/order" method="post">
  <input type="text" name="name" required />

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    pattern="[0-9]{4}[A-Z]{2}"
    title="Dutch zipcode (e.g., 1234AB)"
  />

  <input type="text" name="username" minlength="3" maxlength="20" required />
  <button type="submit">Order</button>
</form>
```

Client-side validation: HTML5 built-in


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<form action="/order" method="post">
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  <input
    type="text"
    name="zipcode"
    pattern="[0-9]{4}[A-Z]{2}"
    title="Dutch zipcode (e.g., 1234AB)"
  />

  <input type="text" name="username" minlength="3" maxlength="20" required />
  <button type="submit">Order</button>
</form>
```

Length constraints

Custom JavaScript validation

```
document.getElementById("order-form").addEventListener("submit", function (e) {
  const quantity = parseInt(this.querySelector('[name="quantity"]').value);
  const email = this.querySelector('[name="email"]').value;

  // Custom business rule
  if (quantity > 10) {
    e.preventDefault();
    alert("Maximum 10 items per order. " + "Contact sales for bulk orders.");
    return;
  }

  // Custom format check
  if (!email.includes("@company.com")) {
    e.preventDefault();
    alert("Please use your company email.");
    return;
  }
});
```

When to use custom JS validation

Business rules

Complex validation

Better error messages

Why client-side is not enough

- Q — Users can disable JavaScript
- N — Users can edit HTML in DevTools
- X — Users can send direct HTTP requests
- ⌨ — Users can use browser console

Client-side vs server-side validation

Client-side

UX enhancement only

Server-side

Security requirement

Demo 4

Server-side validation

Collect all errors, not just the first one

Validation errors: three strategies

We'll examine each in detail

Approach A:
Direct render

Forward directly to form

- ✓ Simple, fast
- × Back button broken
- × Refresh shows warning

Use for: Prototypes only

Approach B:
PRG + flash

Redirect to form, errors in session

- ✓ Best UX
- ✓ No navigation issues
- × More complex

Use for: Production apps

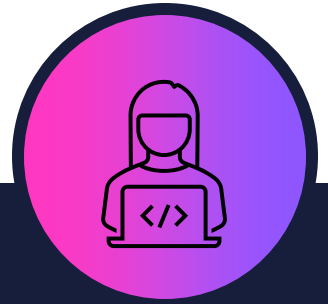
Approach C:
AJAX

Return JSON, show errors inline

- ✓ Best UX
- ✓ No navigation issues
- × Requires JavaScript

Use for: Modern apps

Approach A: forward directly



```
private void handleValidationErrors(...) {
    // Pass errors and original input to JSP
    request.setAttribute("errors", errors);
    request.setAttribute("name", name);
    request.setAttribute("email", email);

    // Forward back to form
    request.getRequestDispatcher("/WEB-INF/order-form.jsp")
           .forward(request, response);
}
```

Approach A: forward directly

What happens:

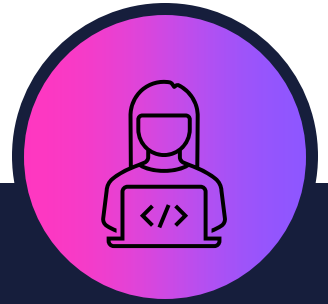
1. User submits invalid form >> POST /order
2. Server validates, finds errors
3. Forwards to order-form.jsp
4. Browser URL still shows “/order”
5. User hits F5 >> “Confirm resubmission?”

Problems:

× Browser thinks last action was POST
× Refresh attempts resubmission
× Back button confusion

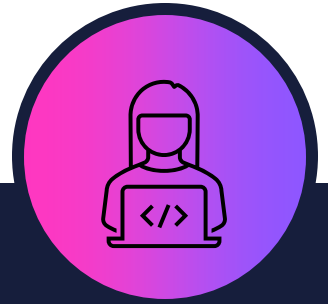
Approach B: RPG + Flash attributes (production ready)

Step 1: Store in session and Redirect



```
private void handleValidationErrors(...) {
    HttpSession session = request.getSession();

    // Store errors temporarily in session
    session.setAttribute("flash_errors", errors);

    // Store form data to repopulate
    Map<String, String> formData = new HashMap<>();
    formData.put("name", name != null ? name : "");
    formData.put("email", email != null ? email : "");
    formData.put("quantity", quantity != null ? quantity : "");
    session.setAttribute("flash_formData", formData);

    // Redirect back to form page
    response.sendRedirect("/order-form");
}
```

Approach B: RPG + Flash attributes (production ready)



Step 2: Display form with flash data

```
@WebServlet("/order-form")
public class OrderFormServlet extends HttpServlet {

    protected void doGet(...) {
        HttpSession session = request.getSession();

        // Retrieve flash data
        List<String> errors =
            (List<String>) session.getAttribute("flash_errors");
        Map<String, String> formData =
            (Map<String, String>) session.getAttribute("flash_formData");

        // CRITICAL: Remove immediately (flash pattern!)
        session.removeAttribute("flash_errors");
        session.removeAttribute("flash_formData");
```

```
        // Pass to JSP
        if (errors != null) {
            request.setAttribute("errors", errors);
        }
        if (formData != null) {
            request.setAttribute("formData", formData);
        }

        request.getRequestDispatcher("/WEB-INF/order-form.jsp")
               .forward(request, response);
    }
}
```

What is flash?

d — Data stored in session **temporarily**

l — Retrieved once and **immediately deleted**

a — Won’t reappear on subsequent refreshes

Complete flow of the “flash” pattern

1. POST /order (invalid data)
2. Store errors in session
3. Redirect to GET /order-form
4. GET /order-form
5. Retrieve flash data from session
6. DELETE flash data from session immediately
7. Show form with errors
8. User refreshes >> GET /order-form again
9. No flash data anymore >> Clean form

Why this works: Data consumed on first display only

Approach B: benefits

Clean user experience:

- **Submit invalid form:**
  - See errors with their input preserved
- **Hit F5 (refresh):**
  - No “Resubmit form” warning
  - No errors shows (flash consumed)
  - Clean form displayed
- **Hit back button**
  - Goes to previous page
  - Clean navigation history
- **Hit forward button**
  - Returns to form
  - No weird behavior

Comparison

Feature	Approach A (direct render)	Approach B (PRG + flash)
Refresh	Warning	Clean
Back button	Broken	Works
History	Messy	Clean

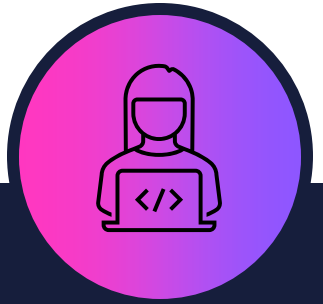
Approach C: AJAX validation

Client-side

```
form.addEventListener("submit", function (e) {
  e.preventDefault(); // Always prevent default

  fetch("/order", {
    method: "POST",
    body: new FormData(this),
  })
    .then((response) => {
      if (response.status === 400) {
        // Validation errors
        return response.json().then((data) => {
          displayValidationErrors(data.errors);
        });
      }
      return response.json();
    })
    .then((data) => {
      // Success
      window.location.href = "/success?orderId=" + data.orderId;
    });
});
```

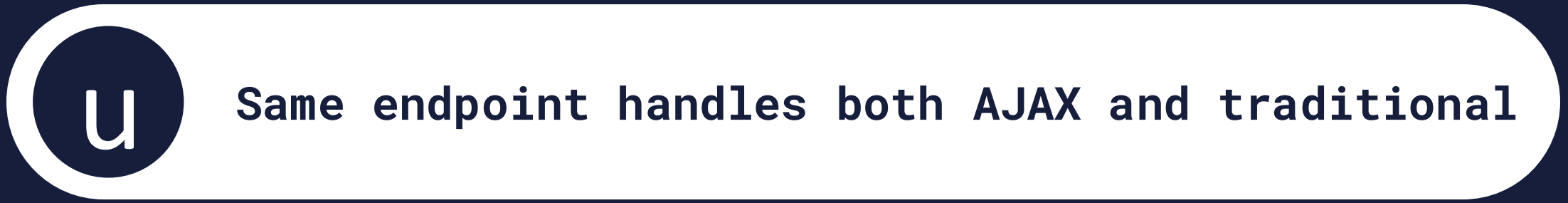
```
function displayValidationErrors(errors) {
  // Show errors next to fields
  errors.forEach((error) => {
    const field = document.querySelector(`[name="${error.field}"]`);
    // Add error message next to field
  });
}
```

Approach C: Server returns JSON errors



```
@WebServlet("/order")
public class OrderServlet extends HttpServlet {

    protected void doPost(...) {
        // Detect AJAX
        boolean isAjax = "XMLHttpRequest".equals(
            request.getHeader("X-Requested-With")
        );

        List<ValidationError> errors = validateOrder(request);

        if (!errors.isEmpty()) {
            if (isAjax) {
                // Return JSON for AJAX
                response.setStatus(400);
                response.setContentType("application/json");
```

```
            // Build JSON with errors
            // { "errors": [ {"field": "email", "message": "..."}, ...] }
        } else {
            // Traditional - use PRG with flash
            handleValidationErrors(...);
        }
        return;
    }

    // Process order...
}
}
```



Which approach to use?

Criteria	Approach A: Direct render	Approach B: PRG + flash	Approach C: AJAX validation
Complexity	Simple	Medium	Complex
Back button	Broken	Clean	Perfect
Refresh	Warning	Clean	Perfect
Accessibility	Works	Works	Needs JS
User experience	Poor	Good	Excellent
Production ready?	No	Yes	Yes

Recommendations

Internal tools/prototypes >> Approach A (direct render)

Public-facing traditional apps >> Approach B (PRG + flash)

Modern SPAs >> Approach C (AJAX validation)

Best of both worlds >> Implement B (PRG + flash), enhance with C (AJAX validation)

Preserving user input

Always preserve user input on errors

Why it matters:

- Users spent time filling out form
- Don’t make them do it again!

Rule: Always pre-fill form fields with user’s previous input

Exercise 2

Implement flash pattern

Given:

Direct rendering of validation errors

Task:

Convert to PRG with flash attributes

Error handling in production

Handling things when they go wrong

Five types of errors

Validation errors
400

- User input doesn’t meet requirements
- User’s responsibility
- Show friendly error, allow correction

Business logic errors
409/422

- Input valid but business rules prevent action
- E.g., out of stock, insufficient balance
- Explain why, suggest alternatives

Auth errors
401/403

- Not logged in or no permission
- Redirect to login or show access denied

Five types of errors

H

Not found
404

- Resource doesn’t exist
- Show helpful 404 page

J

Server errors
500

- Something broke server-side
- Generic message, log details

Validation errors: quick recap

What we already learned:

- Client-side validation (UX)
- Server-side validation (security)
- Three approaches to display errors:
  - Direct render
  - PRG + flash
  - AJAX

Validation errors: key principles

Collect ALL errors, not just first

Preserve user input

Show friendly, specific messages

Return HTTP 400 status code

Business logic error example

Scenario:

- User tries to order 10 items, but only 3 available

This is NOT a validation error:

- Input format is correct
- Business rule prevents the action

How to handle out of stock scenario

Check stock level after validation

R

If insufficient, create friendly error message

e

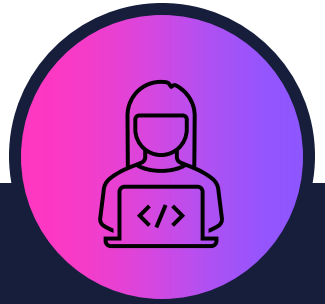
Redirect back with error (PRG pattern)

Show available quantity

Let user adjust and retry

HTTP status code: 409 (conflict) or 422 (unprocessable entity)

Handling out of stock (traditional)

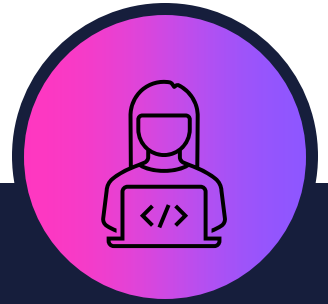


```
protected void doPost(...) {
    String productId = request.getParameter("productId");
    int quantity = Integer.parseInt(request.getParameter("quantity"));

    // Validation passed, check business rules
    Product product = productService.getProduct(productId);

    if (!product.isInStock(quantity)) {
        // Business logic error
        HttpSession session = request.getSession();
        session.setAttribute("flash_error",
            "Sorry, only " + product.getStockLevel() +
            " items available. Please reduce quantity.");
        session.setAttribute("flash_requestedQuantity", quantity);
```

```
            // Redirect back to product page
            response.sendRedirect("/product/" + productId);
            return;
        }

        // Proceed with order
        orderService.createOrder(productId, quantity);
        response.sendRedirect("/success");
    }
```

Business logic errors with AJAX

Server response



```
if (isAjax) {
    if (!product.isInStock(quantity)) {
        response.setStatus(409);  // Conflict
        response.setContentType("application/json");

        PrintWriter out = response.getWriter();
        out.println("{");
        out.println("  \"error\": \"Product out of stock\",");
        out.println("  \"availableQuantity\": " + product.getStockLevel());
        out.println("  \"message\": \"Only " + product.getStockLevel() +
                    " items available\"");
        out.println("}");
        return;
    }
}
```

Business logic errors with AJAX

Client handling

```
.then(response => {
    if (response.status === 409) {
        return response.json().then(data => {
            showError(data.message);
            // Update max quantity in form
            document.querySelector('[name="quantity"]').max =
                data.availableQuantity;
        });
    }
    // ...
})
```

Handling server errors: global configuration

web.xml configuration


```
<error-page>
    <error-code>500</error-code>
    <location>/WEB-INF/error-pages/500.jsp</location>
</error-page>

<error-page>
    <error-code>404</error-code>
    <location>/WEB-INF/error-pages/404.jsp</location>
</error-page>

<error-page>
    <exception-type>java.lang.Exception</exception-type>
    <location>/WEB-INF/error-pages/500.jsp</location>
</error-page>
```

Purpose of global config

- Catch all unhandled exceptions
- Show user-friendly error page
- Hide technical details
- Log for debugging

User-friendly error page

- R — Friendly, apologetic tone
- u — Clear next steps
- P — No technical jargon
- </> — Details only in development

Demo 5

Servlet-level error handling

Exercise 3

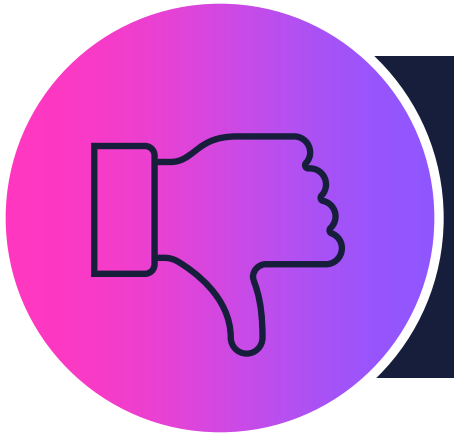
Servlet-level error handling

Time: 30 minutes

Error handling best practices

Golden rules

Never expose technical details



"NullPointerException at OrderService.java:142"

“Something went wrong. Please try again.”

Always log with context

C

```
logger.error("Order failed. User: {}, Product: {}, Qty: {}",
             userId, productId, quantity, exception)
```

Use correct HTTP status codes

400: Validation error

401: Not authenticated

403: Not authorized

404: Not found

409: Business logic conflict

500: Server error

Preserve user input

Don’t make the user re-type everything!

Differentiate error types

Different errors need different handling

Provide helpful context

❌ "Error occurred"
✅ "Unable to process payment. Please check your card details."

❌ "Invalid input"
✅ "Email address must contain an @ symbol"

❌ "Operation failed"
✅ "This product is out of stock. Expected back in 3 days."

Have fallbacks for AJAX


```
.catch(error => {
    // If AJAX completely fails
    if (error.message === 'Failed to fetch') {
        // Fall back to traditional form submission
        formElement.submit();
    }
});
```

Test error scenarios

- Network failures
- Invalid input
- Session expiry
- Database down
- Out of stock

Next up:

Kaasus time!

What would you do?

Scenario 1: The impatient user

User submits order form, waits 30 seconds, sees nothing, submits again.

How would you prevent duplicate orders?

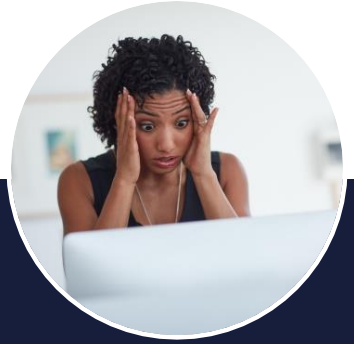
What would you do?

Scenario 2: The multi-tab user

User opens product page in 3 tabs, adds to cart in all 3.

Should cart show 1 item or 3?

What would you do?



Scenario 3: The browser crash

Browser crashes after POST but before redirect.

Order created, but user never saw confirmation. Now what?

What would you do?

Scenario 4:
The network failure

Payment processed but
response never reaches user.

User tries again. How to avoid double charge?

What would you do?

Scenario 5:
The session expiry

User fills out long form, session expires, submits.

How to preserve their work?

Questions or suggestions?

maaike.vanputten@brightboost.nl

See you next time! 💖