

Fullstack Development

Authentication / Authorization

Part 3: Persisting auth's state

Part 3: Social signing up/in

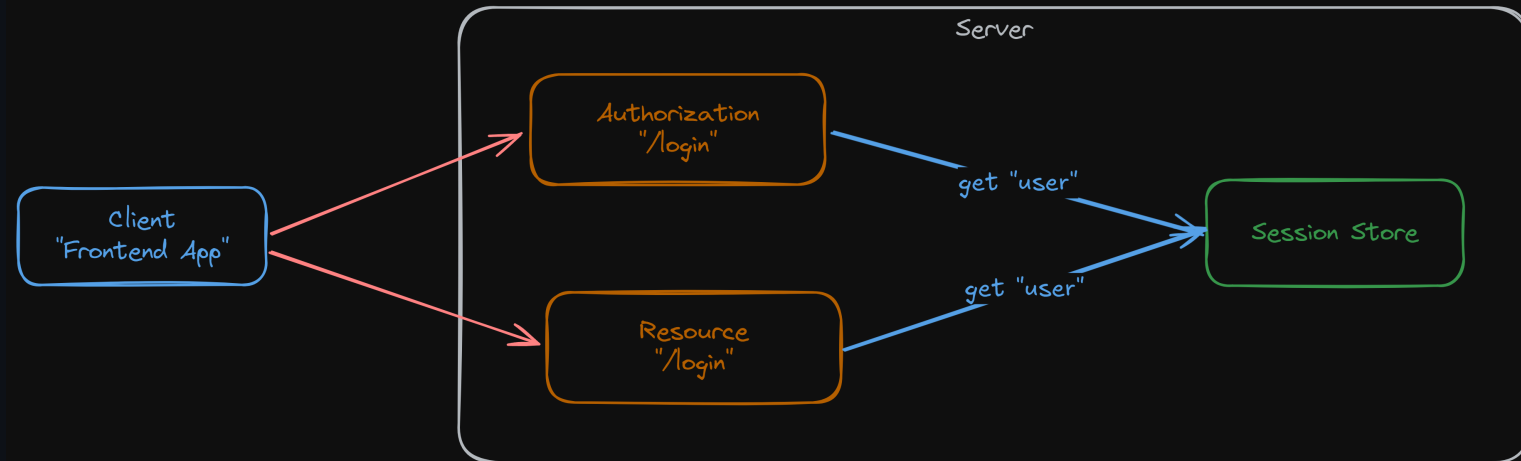
Section 3A: Session-based vs token-based

Session based

- Server is responsible for creating and maintaining the user's authentication state (i.e. in a database).
- After user sign-in, the server sets a cookie that contains the session ID and sends it to the browser.
 - The browser will include it in all further requests.
 - The server will use the cookie to identify the current user session from the database.

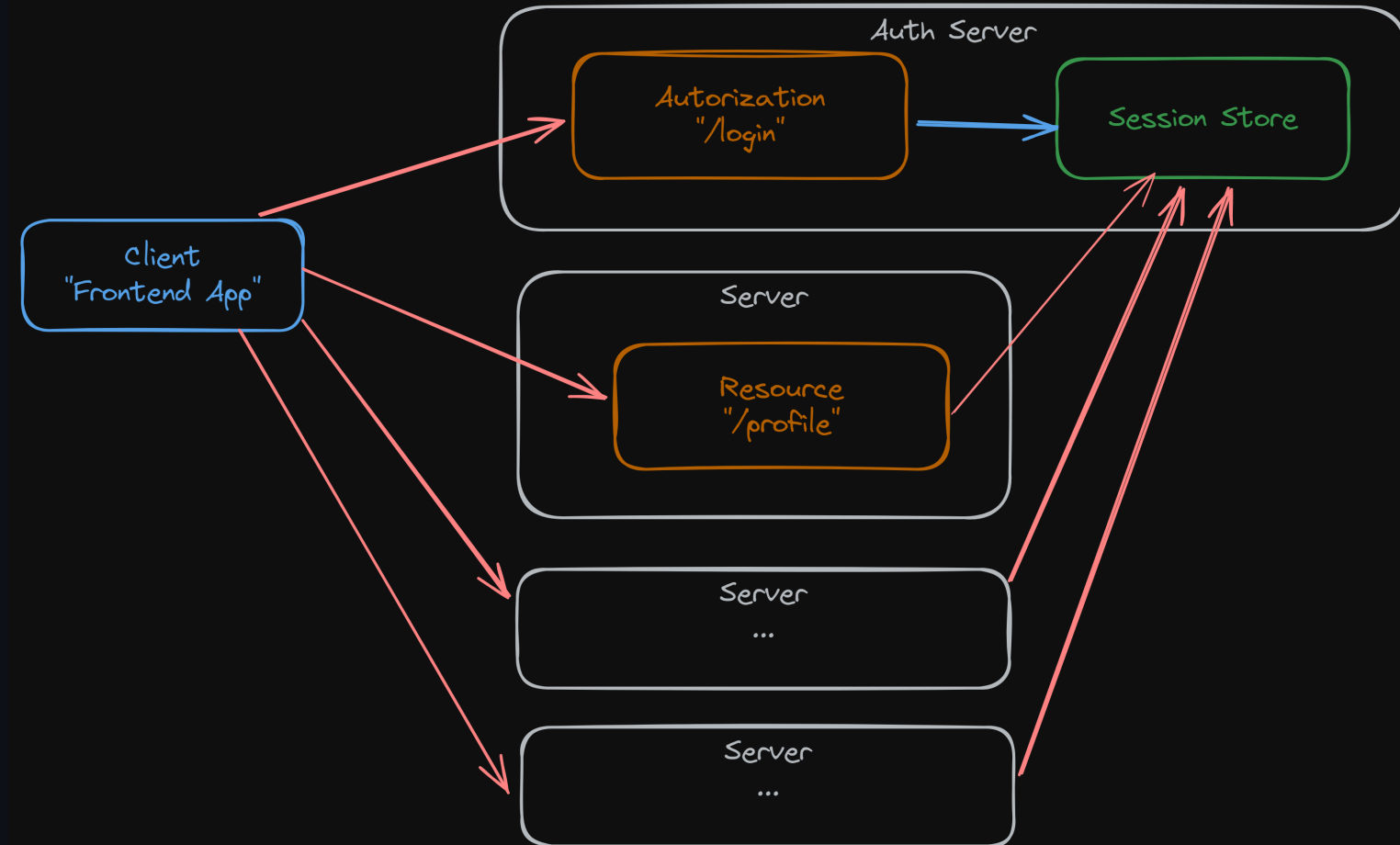
Session based

- Users' auth states are in DB.
- Need to query DB at every request.

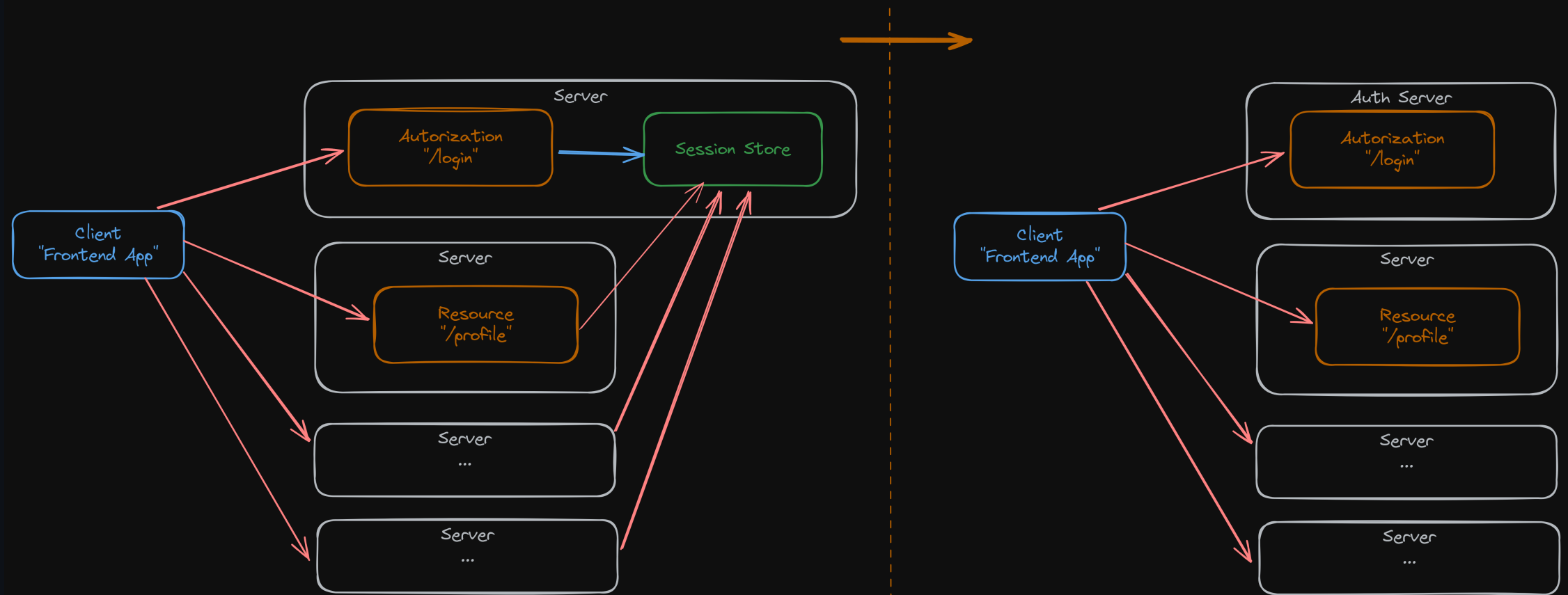


Session based

- This could be a problem in distributed system with centralized auth server.
- Session store could be overloaded.



Can do something like this?



Note that the right-hand side system is not exactly what you want to do.

Token-based

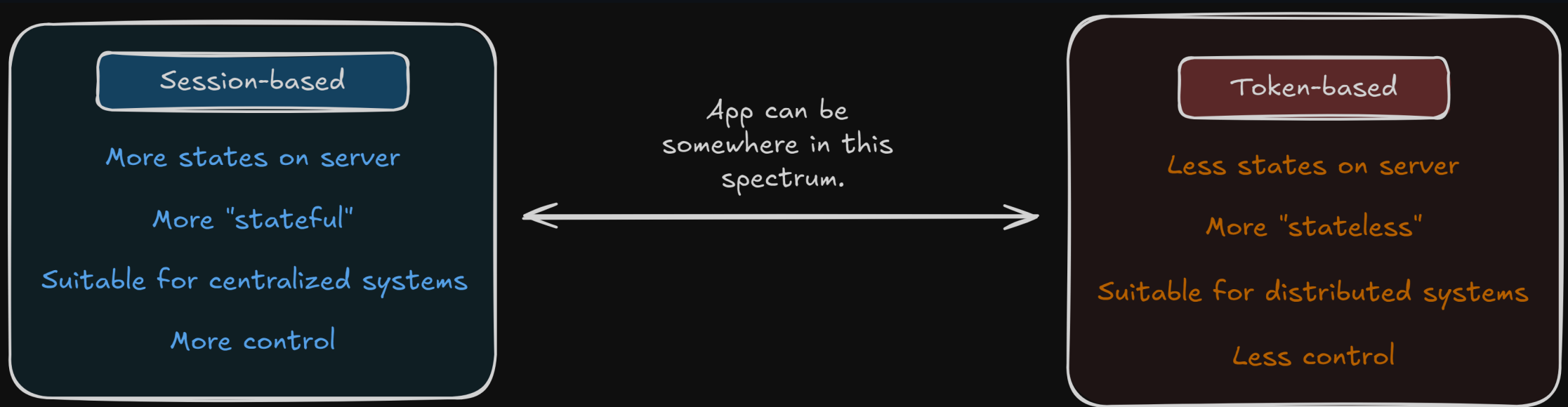
- `token` is a cryptographically signed piece of data that contains information about the authenticated user and their access permissions.
- The server will only have to verify the validity of the token rather than having it stored in a database.
 - Reduces the amount of state that needs to be stored on the server.
- While other token formats exist, JSON Web Tokens (JWTs) have become the prevailing standard for token-based approach.

JWT Test

- `git clone -b jwt https://github.com/fullstack-67/auth-mpa-v2.git auth-jwt`
- `pnpm i`
- `npx tsx ./src/test.ts`

Clarification

- It is better to think about where you put users' `auth` state.
 - `Session-based`: more states in server (*"stateful"*)
 - `Token-based`: more states in client (*stateless*)
- Using JWTs does not automatically means you are using token-based approach.
 - You can put JWTs in session cookie.
- The system can contain both approaches.



- When going token-based approach, you are losing **control** over user's state and you are making your system **less secured**.

Please do not do this.

- It is tempting to go **100% stateless** using token-based approach (JWT) to avoid dealing to storing information on server.
 - **You don't know who is using your system!**
- Also, be aware of these concerns ([Ref1](#), [Ref2](#)).
 - Cannot really log out users.
 - Cannot really block users.
 - Stale data
 - Limited storage
 - JWT could be decrypted at some point.

Considering token-based approach?

- Do you have distributed system with centralized auth server?
 - If no, go session-based.
- You are concerned about overloading your database.
 - Have you considered `redis`?

Considering token-based approach?

- Have you consider the fact that modern token security is quite complex (*and will require database anyway*)?
 - Refresh tokens (revokable)
 - Allowed/Revoked lists
 - Token rotation
 - Token behavior detection

Bottom line

| If you don't know who are using your apps, please do something about it.

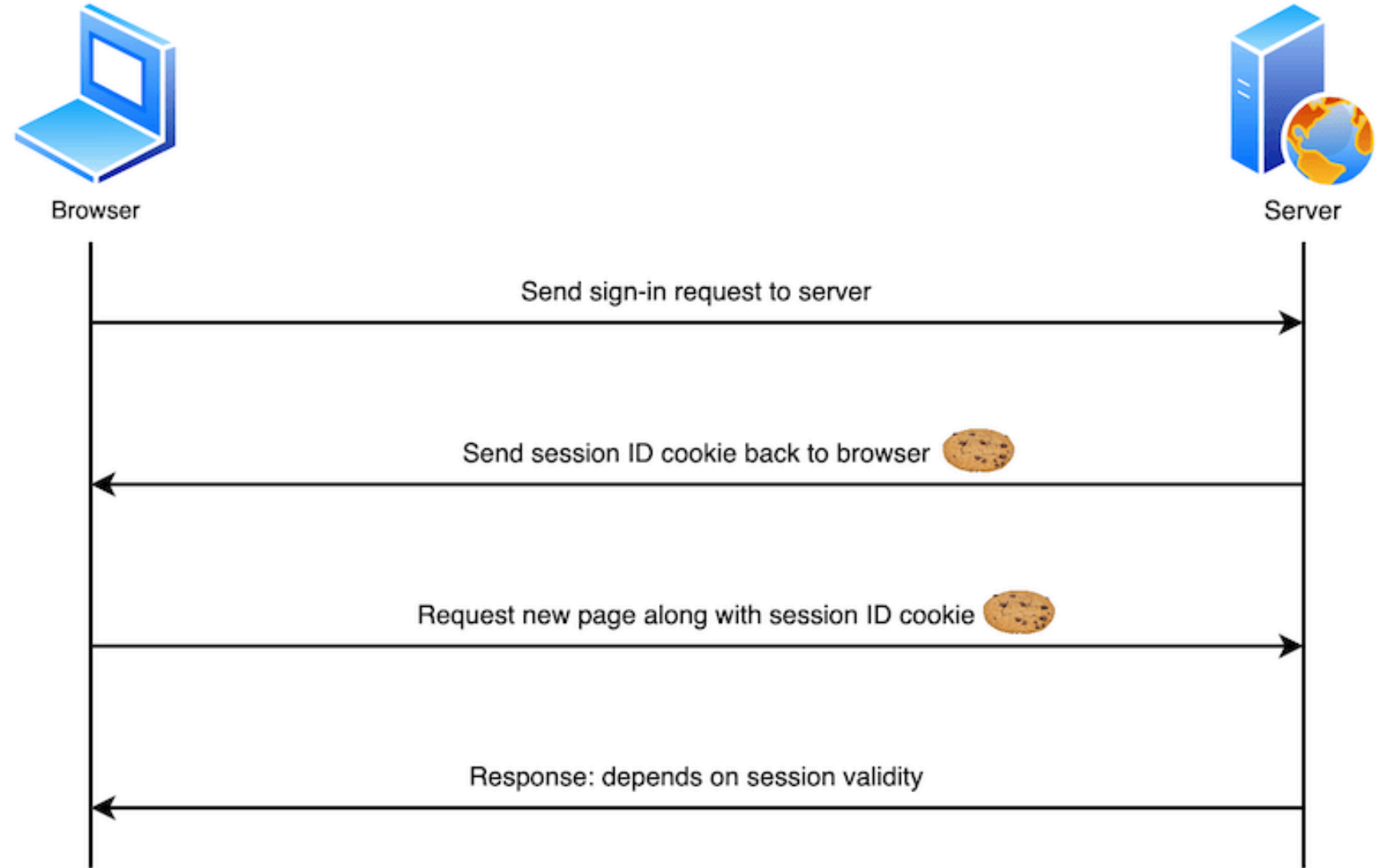
Part 3: Persisting auth's state

Section 3B: Session management with `express-session`

Cookie

- A small piece of data a server sends to a user's web browser.
- The browser may:
 - Store cookies
 - Create new cookies
 - Modify existing ones
 - Send it back to the server with later requests.
- Cookies enable web applications to store limited amounts of data and remember state information
 - By default the HTTP protocol is `stateless`.

Cookie



Cookie mechanism

- Server `response` header

```
HTTP/1.1 200 OK
Set-Cookie: connect.sid=s%3AUDOk...; Path=/; Expires=Fri, 30 Aug 2024 02:57:01 GMT; HttpOnly; SameSite=Lax
```

- Subsequent browser `request` header

```
GET / HTTP/1.1
Cookie: connect.sid=s%3AUDOk
```

Cookie attributes

- `Path=<path-value>`
 - Path that must exist in the requested URL for the browser to send the Cookie header
- `Expires=<date>`
 - Maximum lifetime
- `Max-Age=<number>`
 - The number of seconds until the cookie expires.
- `Secure`
 - Sent cookie to the server only with `https` schema.

Cookie attributes

- `HttpOnly`
 - Forbids JavaScript from accessing the cookie (`Document.cookie`).
 - Prevent against cross-site scripting (XSS).
- `SameSite`
 - Controls whether or not a cookie is sent with cross-site requests.
 - `Strict` / `Lax` / `None`
 - Will come back to this later.

Setup

- `git clone -b session https://github.com/fullstack-67/auth-mpa-v2.git auth-session`
- `pnpm i`
- `npm run db:reset`
- `npm run dev`

Highlighted package

package.json

```
{  
  "express-session": "^1.18.0"  
}
```


Usage

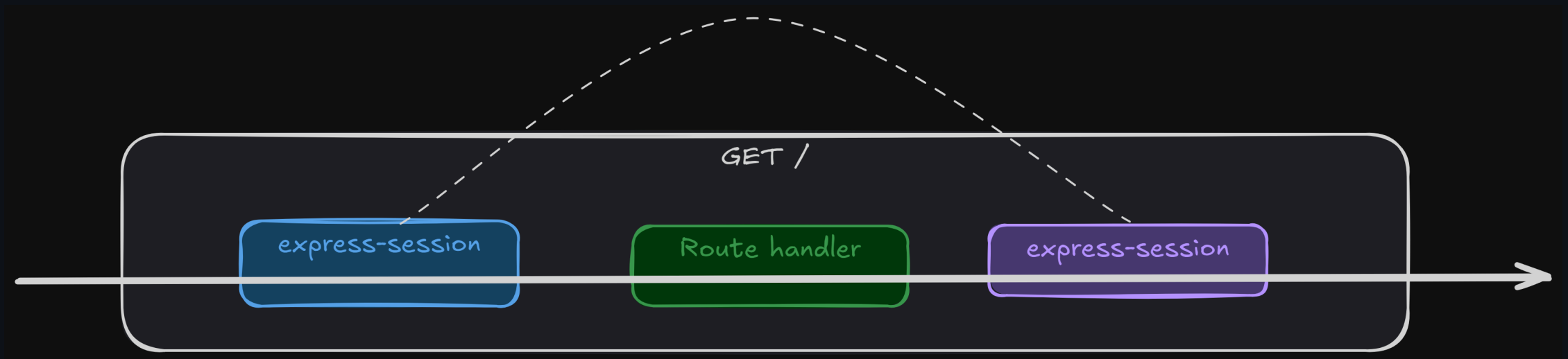
session.ts

```
import session from "express-session";  
// ...  
const sessionIns = session({  
  // Options  
});
```

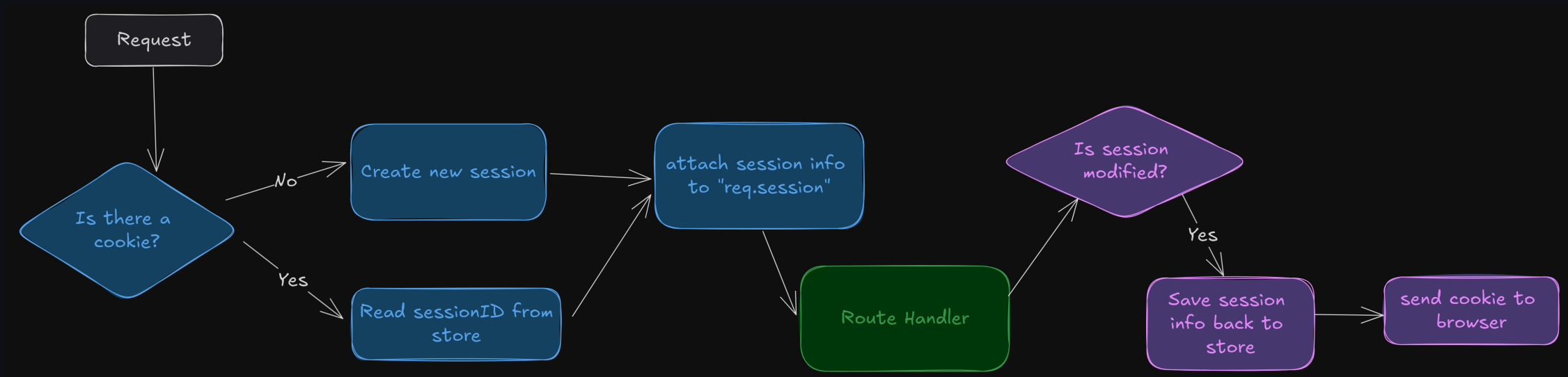
index.ts

```
app.use(sessionIns);
```

How does `express-session` work?



How does **express-session** work?



Session store

- Storage mechanism for sessions.
- If you don't supply anything, it just uses a `memory` store.
 - Not persisted across server restarts
- Other choices

Database store

./db/schema.ts

```
export const sessionsTable = sqliteTable("sessions", {  
  sid: text("sid").primaryKey(),  
  expired: integer("expired"),  
  sess: text("sess", { mode: "json" }),  
});
```

Experiments

- Clear all cookies in browser and visit the `url`.
 - No cookie sent from server.
- Set `count` in `req.session`
 - Cookie saved in store.
 - Cookie sent from server.
- Open new tab/window.
 - Cookie are sent with client requests.
- Open Edge.
 - New sessionse are created.
- Set `useragent`.

Session options

./src/auth/session.ts

```
const sessionIns = session({
  secret: "My Super Secret",
  cookie: {
    path: "/",
    httpOnly: true,
    secure: NODE_ENV === "production" ? true : false,
    maxAge: 60 * 60 * 1000,
    sameSite: "lax",
  },
  saveUninitialized: false,
  resave: false,
  store: SQLiteStoreInstance as session.Store,
});
```

Session options

- `saveUninitialized`
 - Forces a session that is "uninitialized" to be saved to the store.
 - A session is uninitialized when it is new but not modified.
- `resave`
 - Forces the session to be saved back to the session store, even if the session was never modified during the request.

Remaining task

- We need a way to link authentication state to session.

Part 3: Persisting auth's state

Section 3C: Session + authentication

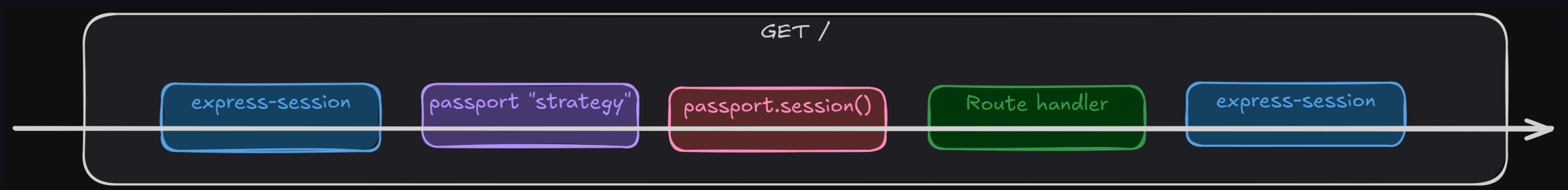
We need to

- Store user information in a session store when user sign in.
- Retrieve user information for route handlers for subsequent requests.
- Destroy sessions when users log out.

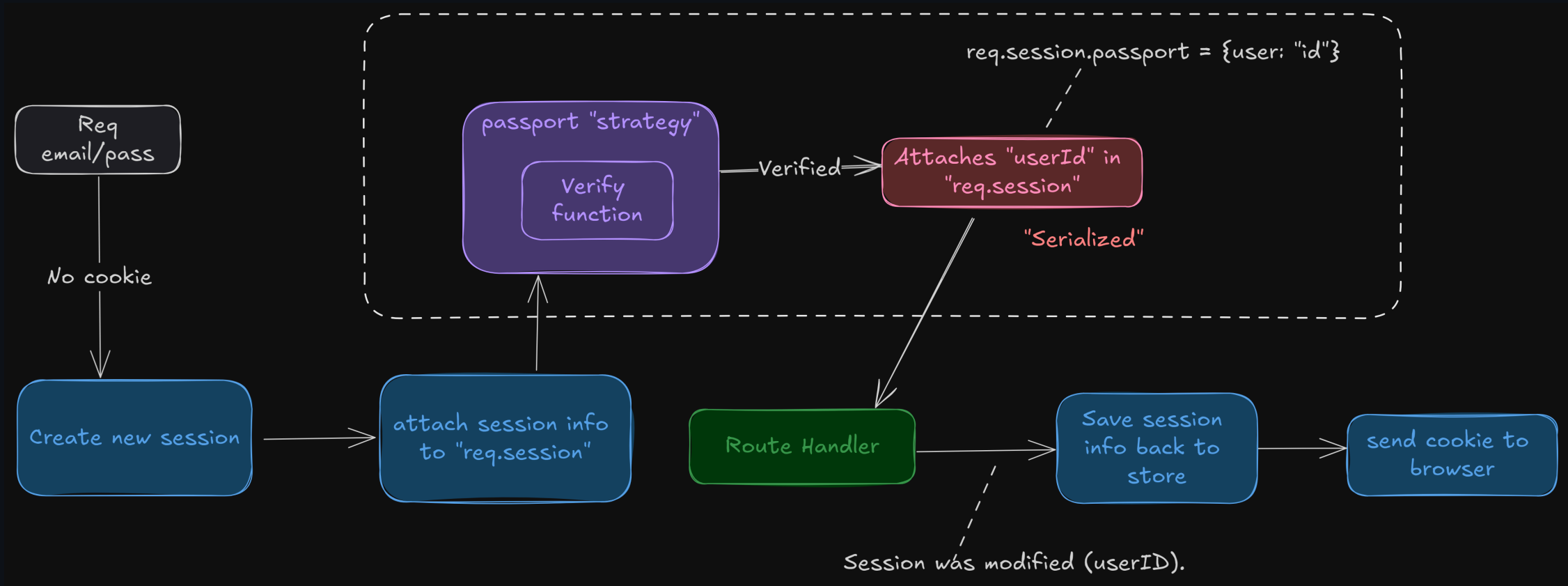
Two session middlewares

- `express-session`
 - Middleware to save/retrieve session from a session store.
 - Imagine that session information only contains `userId`.
- `passport.session()`
 - Middleware to get full user information from `userId`.
 - Middle to write `userId` to session when user log in.
- `REF1`, `REF2`

Structure

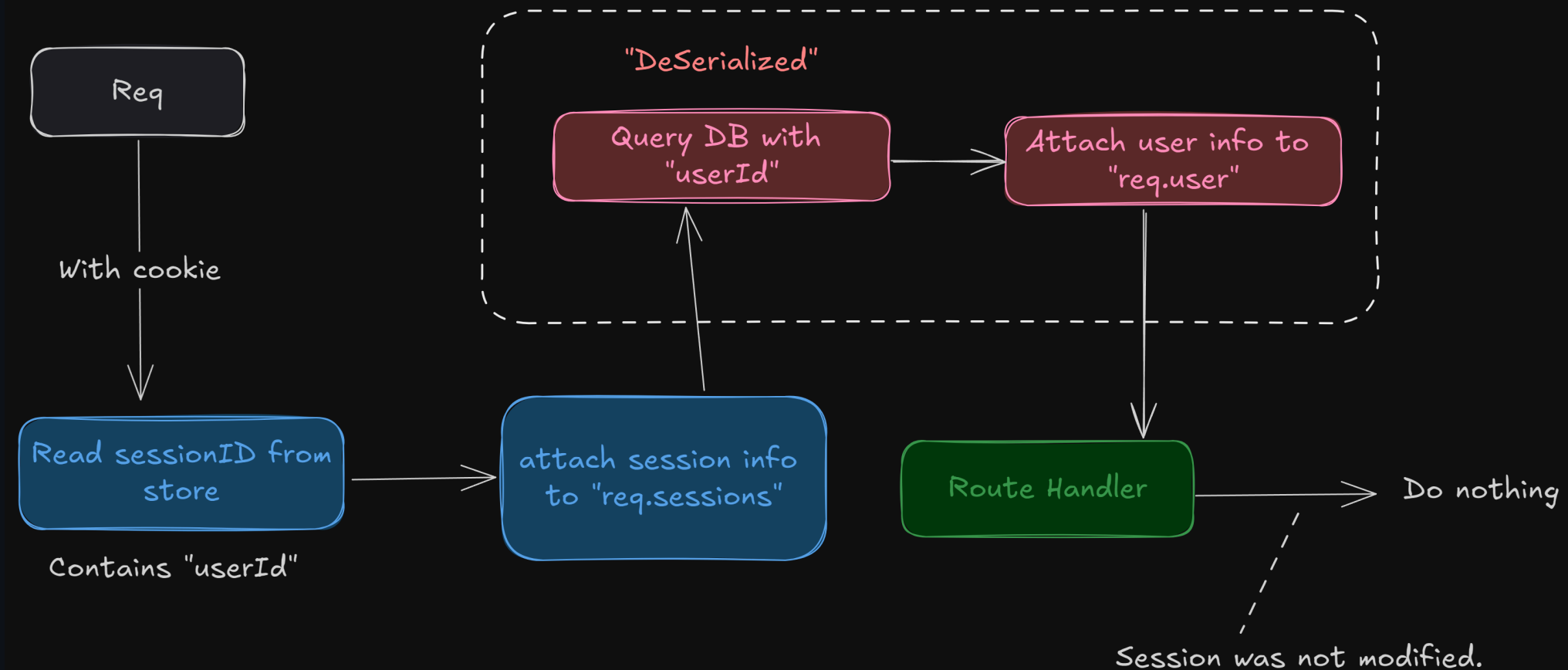


User login



Note: Serialization

Subsequent requests



Note: Deserialization

Setup

- `git clone -b signin-credential-session https://github.com/fullstack-67/auth-mpa-v2.git auth-signin-credential-session`
- `pnpm i`
- `npm run db:reset`
- `npm run dev`

Registering middlewares

./src/index.ts

```
// * express-session
app.use(sessionIns);

// * Passport
app.use(passportIns.initialize());
app.use(passportIns.session()); // ➡➡➡ passport.session
```

Serialization

```
./src/auth/passport.ts
```

```
passportIns.serializeUser(function (user, done) {  
  // Sending user.id to session.  
  done(null, user.id);  
  // You can put all user info in the session  
  // done(null, user);  
});
```

Note: Putting all user info in session is not recommended.

Deserialization

./src/auth/passport.ts

```
passportIns.deserializeUser<string>(async function (id, done) {  
  const query = await dbClient.query.usersTable.findFirst({  
    where: eq(usersTable.id, id),  
  });  
  if (!query) {  
    done(null, false);  
  } else {  
    done(null, query);  
  }  
});
```

Experiments

- Sign in
 - Note the user `id` in `req.session.passport`
- Sign out
- Sign in from two browsers.
 - Try removing other sessions. *(Cool!)*

SameSite cookie revisited

- Strict
 - Sent on first-party request only.
- Lax
 - Sent on third-party requests from top-level navigation and GET requests.
- None
 - No restriction.

Experiments

- With `strict` cookie (`./src/auth/session.ts`)
 - Redirect through `<a>` tag result in "guest" view.
 - Subsequent navigation will yield "user" view.
 - If navigate by changing `url` in the address bar results in correct "user" view.
- With `lax` cookie
 - Redirect through `<a>` tag will yield correct "user" view.

Typescript tips

- Extending `req.user` types with `drizzle` orm.

`./src/types/express.d.ts`

```
type usersTableType = typeof usersTable.$inferSelect;
declare global {
  namespace Express {
    interface User extends usersTableType {} ➡➡➡
  }
}
```

Typescript tips

- Extending `req.session` types

`./src/types/session.d.ts`

```
declare module "express-session" {  
  interface SessionData {  
    userAgent?: Details;  
    createdAt?: number;  
    loginType: LoginType;  
    passport?: { user: string };  
  }  
}
```


Tips

- I use `sessionID` that contains `userID` so that I can easily query all sessions that belongs to the same users.

`./src/auth/session.ts`

```
const generateSessionKey = (req: Request) => {  
  const userId = req.user?.id ?? nanoid();  
  const randomId = nanoid();  
  return `sid:${userId}:${randomId}`;  
};
```

- Query all user sessions

`./db/repositories.ts`

```
export async function getAllUserSessions(userId: string) {  
  // ...  
  const results = await dbClient  
    .select()  
    .from(sessionsTable)  
    .where(like(sessionsTable.sid, likeString));  
  // ...  
}
```

Part 3: Persisting auth's state

Section 4: Putting everything together

Moving parts

- Auth Framework
 - passport
- Auth strategies
 - passport-local
 - passport-oauth2
- Session management
 - express-session
 - passport.session()

Setup

- `git clone -b main https://github.com/fullstack-67/auth-mpa-v2.git auth-main`
- `pnpm i`
- Fill in `.env`
- `npm run db:reset`
- `npm run dev`

Features

- Signup by credential.
- Login by credentials
- Login by social providers
- Session show all sessions same user.
- Delete another session.

| All of this are for MPA, what about SPA?

Next: SPA