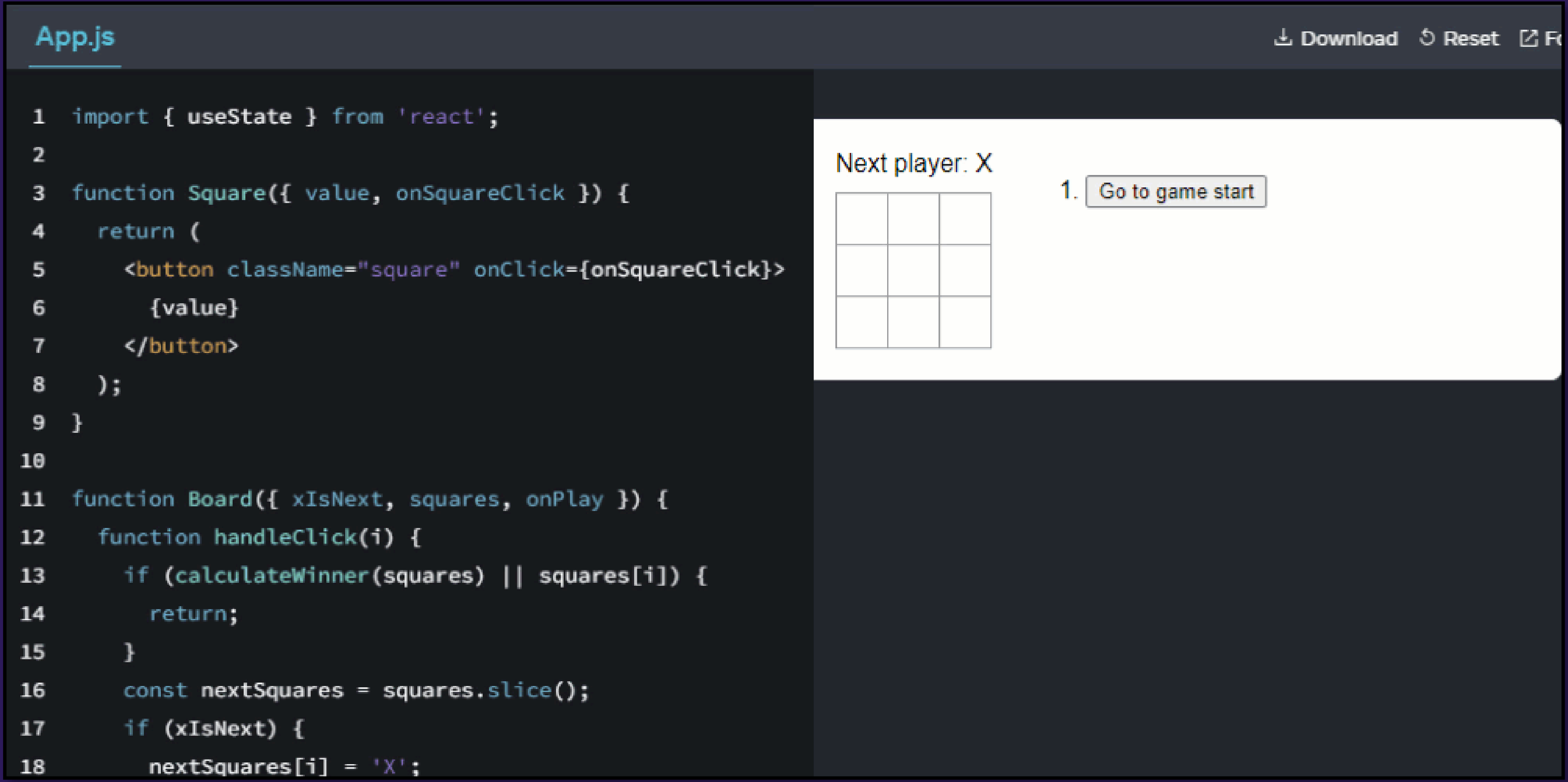
React and the Art of Gamification

Courtney Yatteau

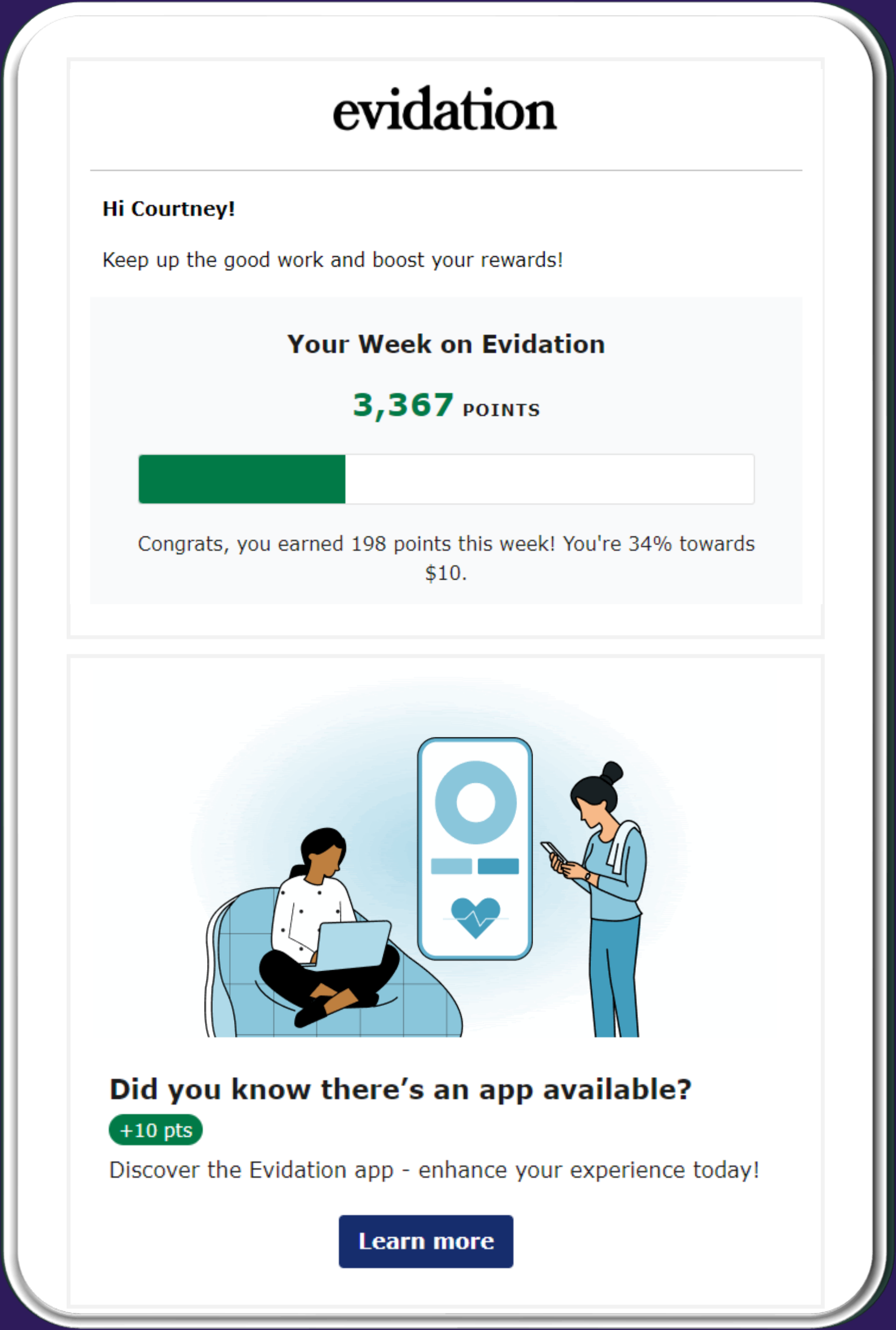
START

Gamifying React Education


App.js

```
import { useState } from 'react';

function Square({ value, onSquareClick }) {
  return (
    <button className="square" onClick={onSquareClick}>
      {value}
    </button>
  );
}

function Board({ xIsNext, squares, onPlay }) {
  function handleClick(i) {
    if (calculateWinner(squares) || squares[i]) {
      return;
    }
    const nextSquares = squares.slice();
    if (xIsNext) {
      nextSquares[i] = 'X';
```

Next player: X


evidation

Hi Courtney!

Keep up the good work and boost your rewards!

Your Week on Evidation

3,367 POINTS

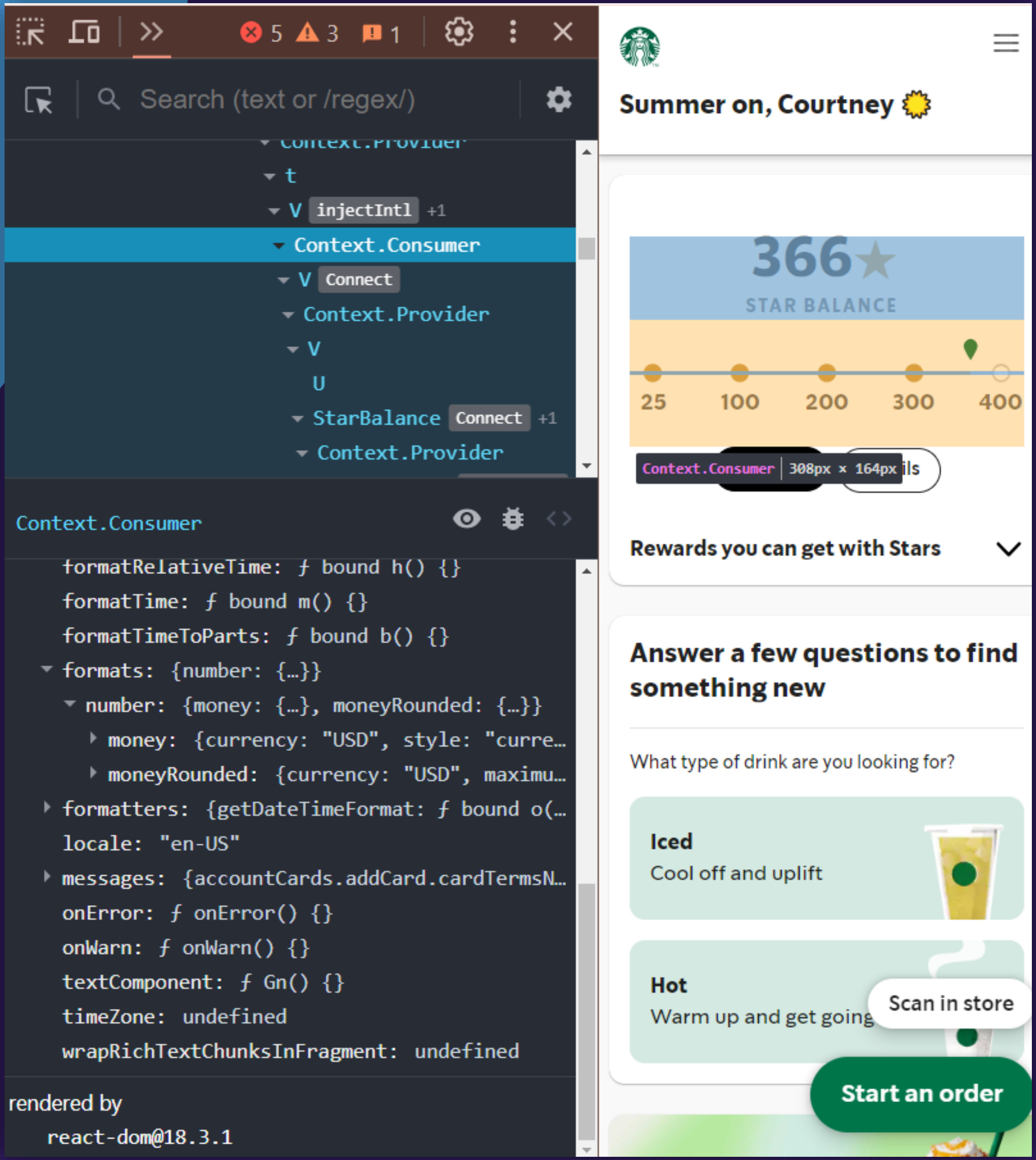
Congrats, you earned 198 points this week! You're 34% towards $10.

Did you know there's an app available?

+10 pts

Discover the Evidation app - enhance your experience today!

Learn more



```
5  3  1
Search (text or /regex/)
    Context.Provider
      t
        V  injectIntl  +1
          Context.Consumer
            V  Connect
              Context.Provider
                V
                  U
                  StarBalance  Connect  +1
                    Context.Provider

Context.Consumer
    formatRelativeTime: ƒ bound h() {}
    formatTime: ƒ bound m() {}
    formatTimeToParts: ƒ bound b() {}
  ▾ formats: {number: {…}}
    ▾ number: {money: {…}, moneyRounded: {…}}
      ▸ money: {currency: "USD", style: "curre…
      ▸ moneyRounded: {currency: "USD", maximu…
  ▸ formatters: {getDateTimeFormat: ƒ bound o(…
    locale: "en-US"
  ▸ messages: {accountCards.addCard.cardTermsN…
    onError: ƒ onError() {}
    onWarn: ƒ onWarn() {}
    textComponent: ƒ Gn() {}
    timeZone: undefined
    wrapRichTextChunksInFragment: undefined
rendered by
  react-dom@18.3.1
```

Summer on, Courtney

366★
STAR BALANCE
25 100 200 300 400

Context.Consumer | 308px × 164px

Rewards you can get with Stars

Answer a few questions to find something new

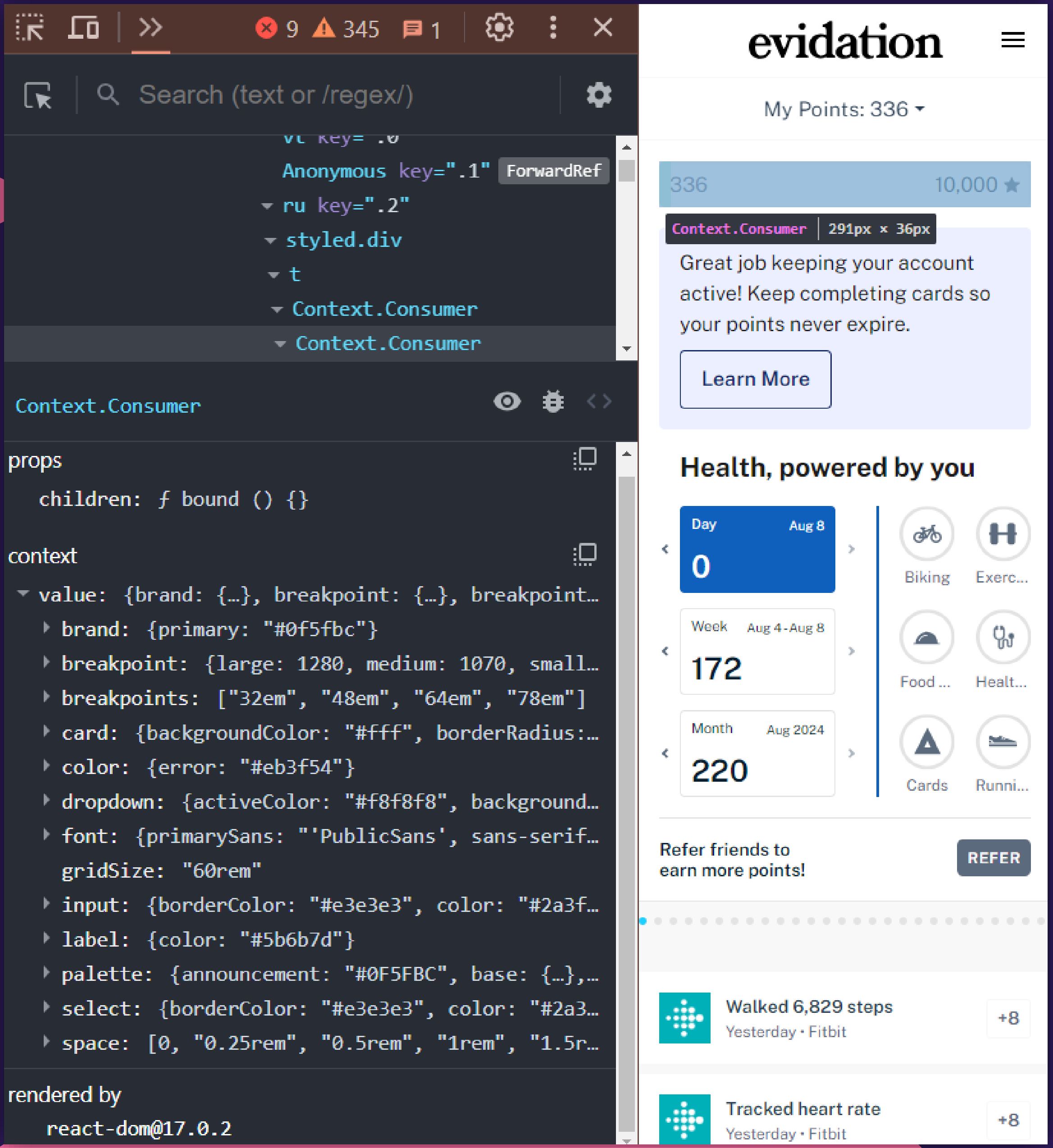
What type of drink are you looking for?

Iced
Cool off and uplift

Hot
Warm up and get going

Scan in store

Start an order



```
9  345  1
Search (text or /regex/)
            Anonymous key=".1"  ForwardRef
          ▾ ru key=".2"
            ▾ styled.div
              ▾ t
                ▾ Context.Consumer
                  ▾ Context.Consumer

Context.Consumer
props
  children: ƒ bound () {}
context
▾ value: {brand: {…}, breakpoint: {…}, breakpoint…
  ▸ brand: {primary: "#0f5fbc"}
  ▸ breakpoint: {large: 1280, medium: 1070, small…
  ▸ breakpoints: ["32em", "48em", "64em", "78em"]
  ▸ card: {backgroundColor: "#fff", borderRadius:…
  ▸ color: {error: "#eb3f54"}
  ▸ dropdown: {activeColor: "#f8f8f8", background…
  ▸ font: {primarySans: "'PublicSans', sans-serif…
    gridSize: "60rem"
  ▸ input: {borderColor: "#e3e3e3", color: "#2a3f…
  ▸ label: {color: "#5b6b7d"}
  ▸ palette: {announcement: "#0F5FBC", base: {…},…
  ▸ select: {borderColor: "#e3e3e3", color: "#2a3…
  ▸ space: [0, "0.25rem", "0.5rem", "1rem", "1.5r…
rendered by
  react-dom@17.0.2
```

evidation

My Points: 336

336 10,000 ★

Context.Consumer | 291px × 36px

Great job keeping your account active! Keep completing cards so your points never expire.

Learn More

Health, powered by you

Day Aug 8	0
Week Aug 4 - Aug 8	172
Month Aug 2024	220

Biking
Exerc...
Food ...
Healt...
Cards
Runni...

Refer friends to earn more points!
REFER

Walked 6,829 steps
Yesterday · Fitbit
+8

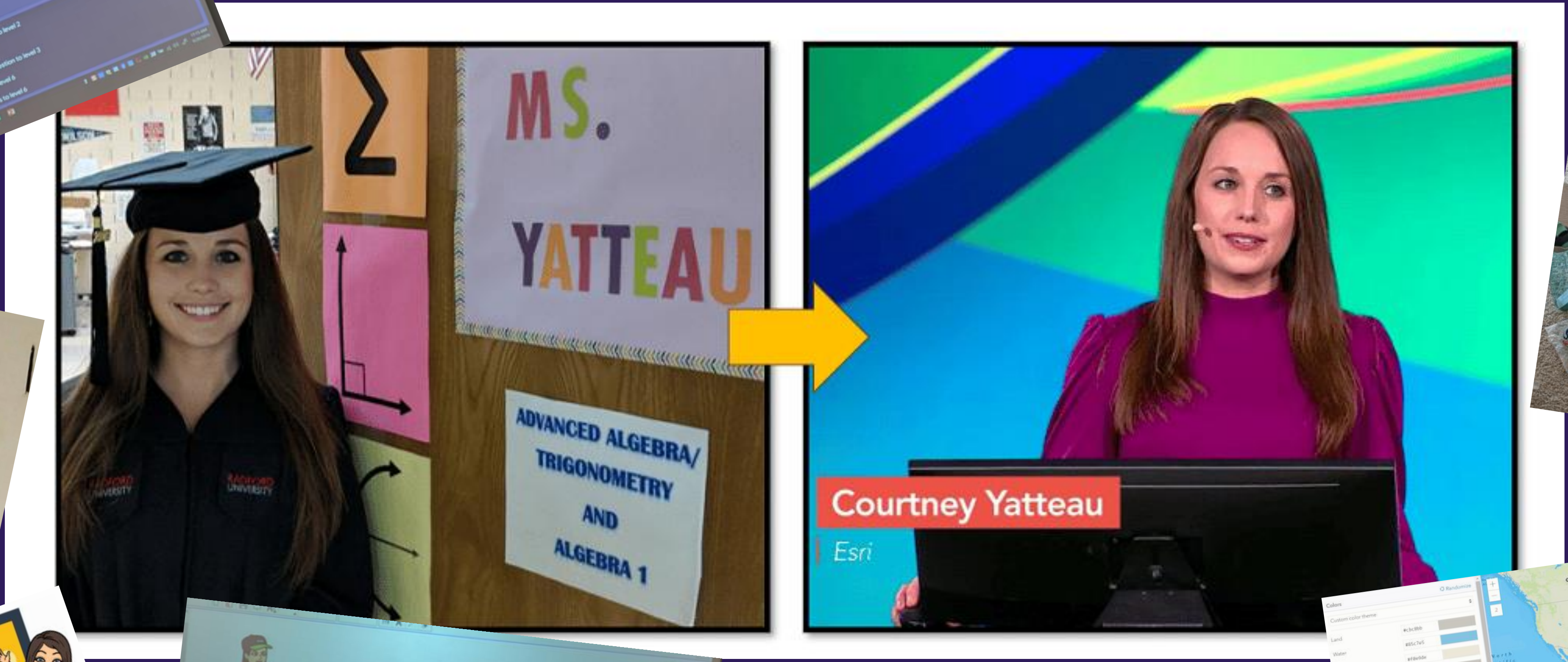
Tracked heart rate
Yesterday · Fitbit
+8

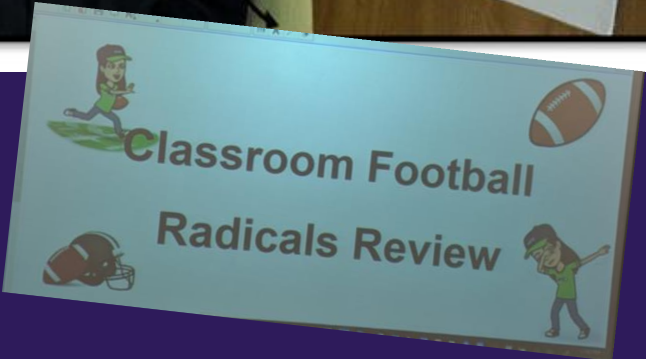
Effective gamification creates an ecosystem where users are constantly motivated to engage, improve, and achieve. It's about harnessing the power of game mechanics to drive real-world results.

- Sebastian Deterding

Courtney Yatteau

Developer Advocate, Esri



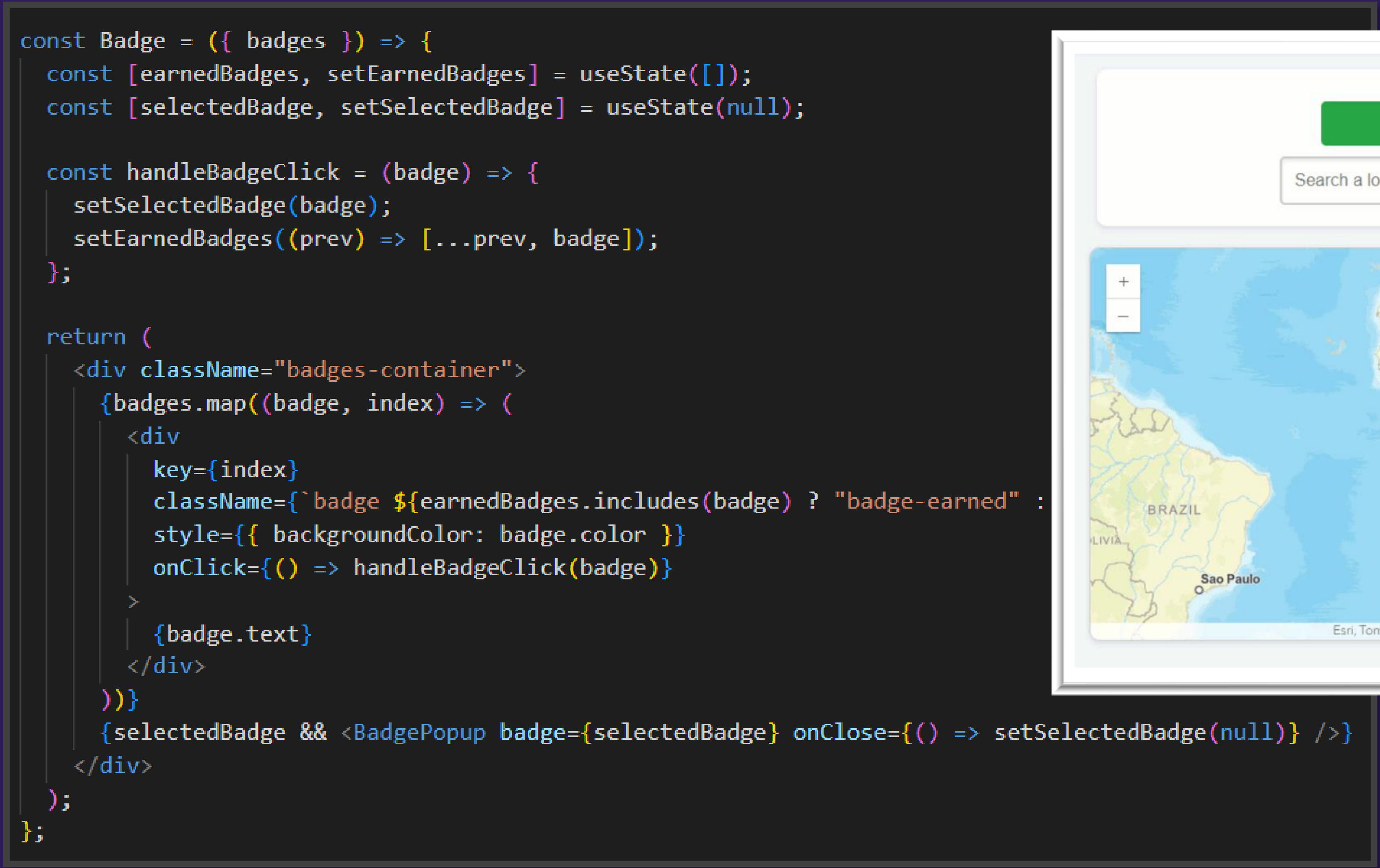


G.A.M.E.S.

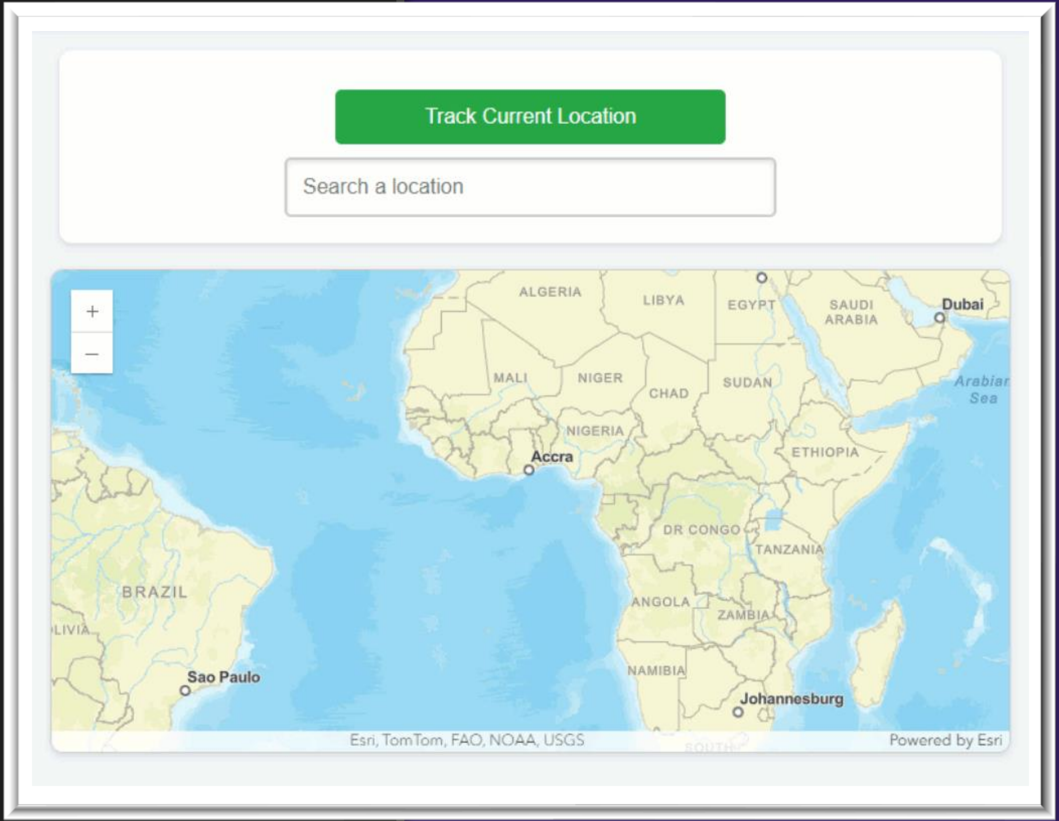
G A M E S

Gamified UI Components

Gamified UI Components

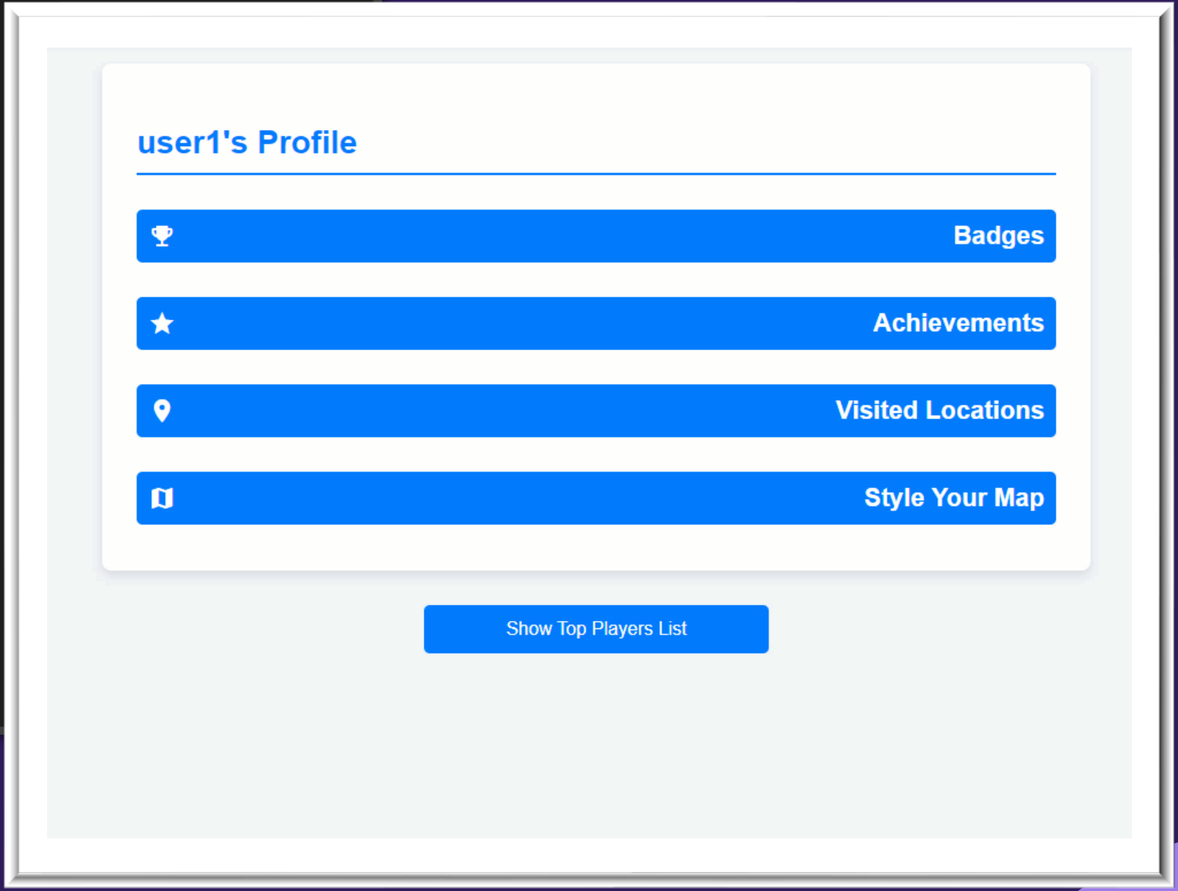


```
const Badge = ({ badges }) => {
  const [earnedBadges, setEarnedBadges] = useState([]);
  const [selectedBadge, setSelectedBadge] = useState(null);

  const handleBadgeClick = (badge) => {
    setSelectedBadge(badge);
    setEarnedBadges((prev) => [...prev, badge]);
  };

  return (
    <div className="badges-container">
      {badges.map((badge, index) => (
        <div
          key={index}
          className={`badge ${earnedBadges.includes(badge) ? "badge-earned" :
          style={{ backgroundColor: badge.color }}
          onClick={() => handleBadgeClick(badge)}
        >
          {badge.text}
        </div>
      ))}
      {selectedBadge && <BadgePopup badge={selectedBadge} onClose={() => setSelectedBadge(null)} />}
    </div>
  );
};
```



Gamified UI Components

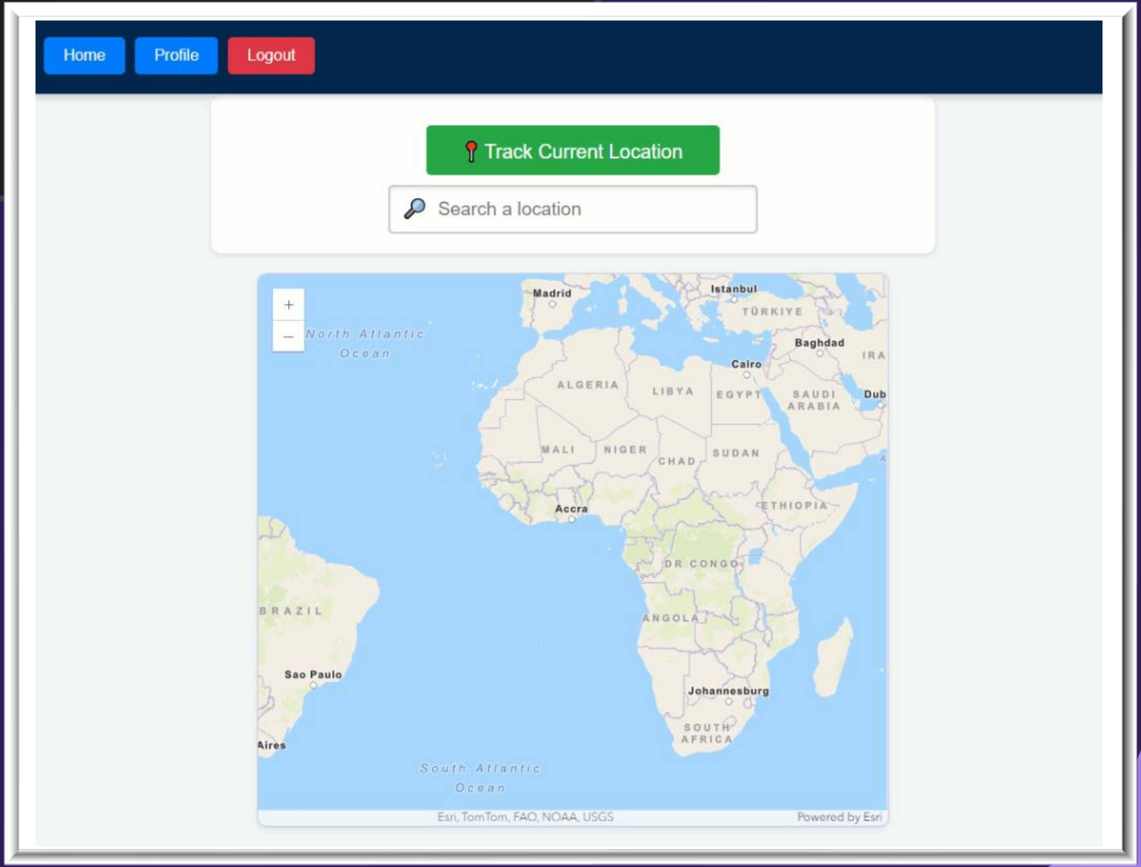
```
const ProgressBar = ({ points, maxPoints }) => {
  const progress = Math.min((points / maxPoints) * 100, 100);

  return (
    <div className="progress-bar">
      <div
        className="progress-bar-fill"
        style={{ width: `${progress}%` }}
      ></div>
      <span className="progress-bar-text">
        {points} / {maxPoints} Points
      </span>
    </div>
  );
};
```


user1's Profile

Gamified UI Components

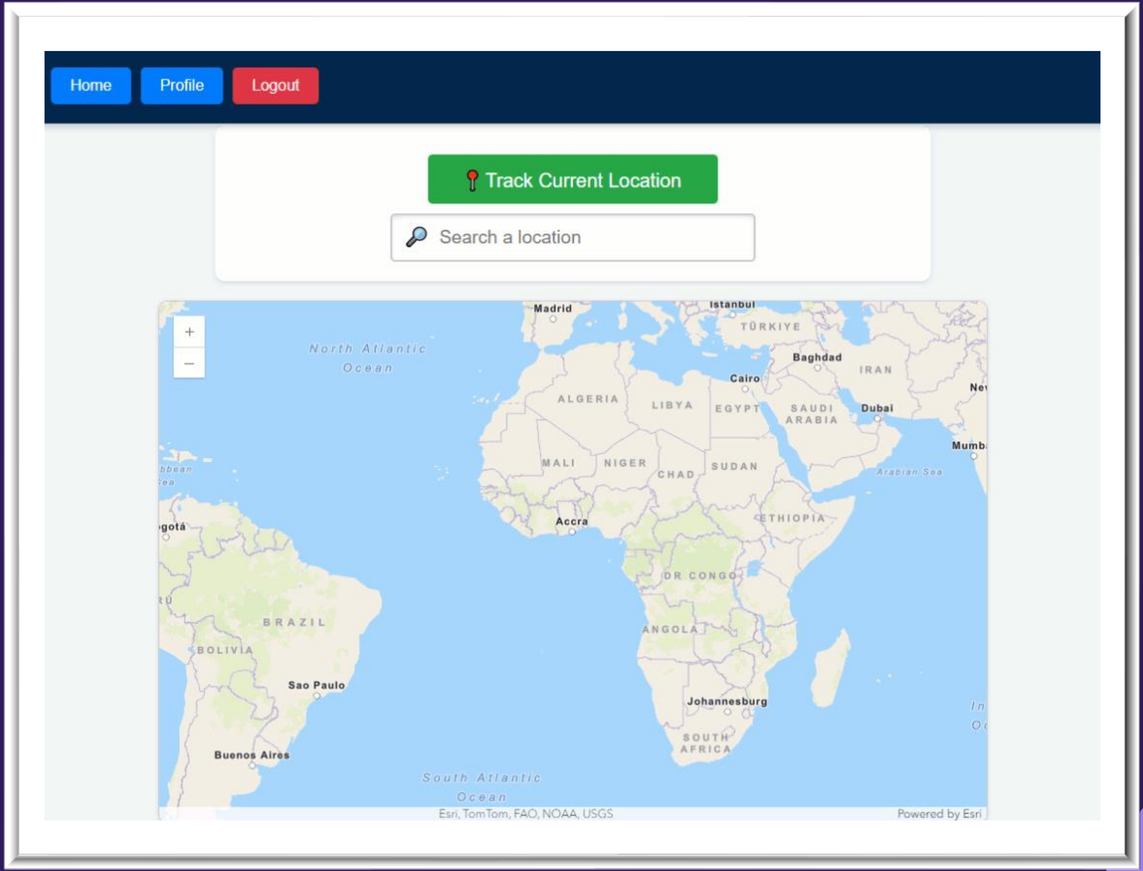
```
const showAchievementPopupMessage = (points, text) => {
  setAchievementMessage(`Congrats! You've earned ${points} points for ${text}`);
  setShowAchievementPopup(true);
  setTimeout(() => {
    setShowAchievementPopup(false);
  }, 3000);
};
```

```
{earnedAchievements.map((achievement, index) => (
  <div key={index} className="achievement-card">
    <h4>{achievement.text}</h4>
    <p>{achievement.description}</p>
    <p>Points: {achievement.points}</p>
  </div>
))}
```



Gamified UI Components

```
const basemapOptions = [
  {
    id: "11b7300674584eb793129a808290d235",
    name: "Default Basemap",
    unlocked: true,
  },
  {
    id: "456d1df3810e482b8abcb2aa0440d6ac",
    name: "Valentine's Basemap",
    unlocked: user.visitedLocations.length >= 1,
  },
  {
    id: "f5023edabfee4dd68f2e3f87e2a6c14d",
    name: "Popcorn Basemap",
    unlocked: user.achievements.length >= 2,
  },
];
```



G

Gamified UI Components

A

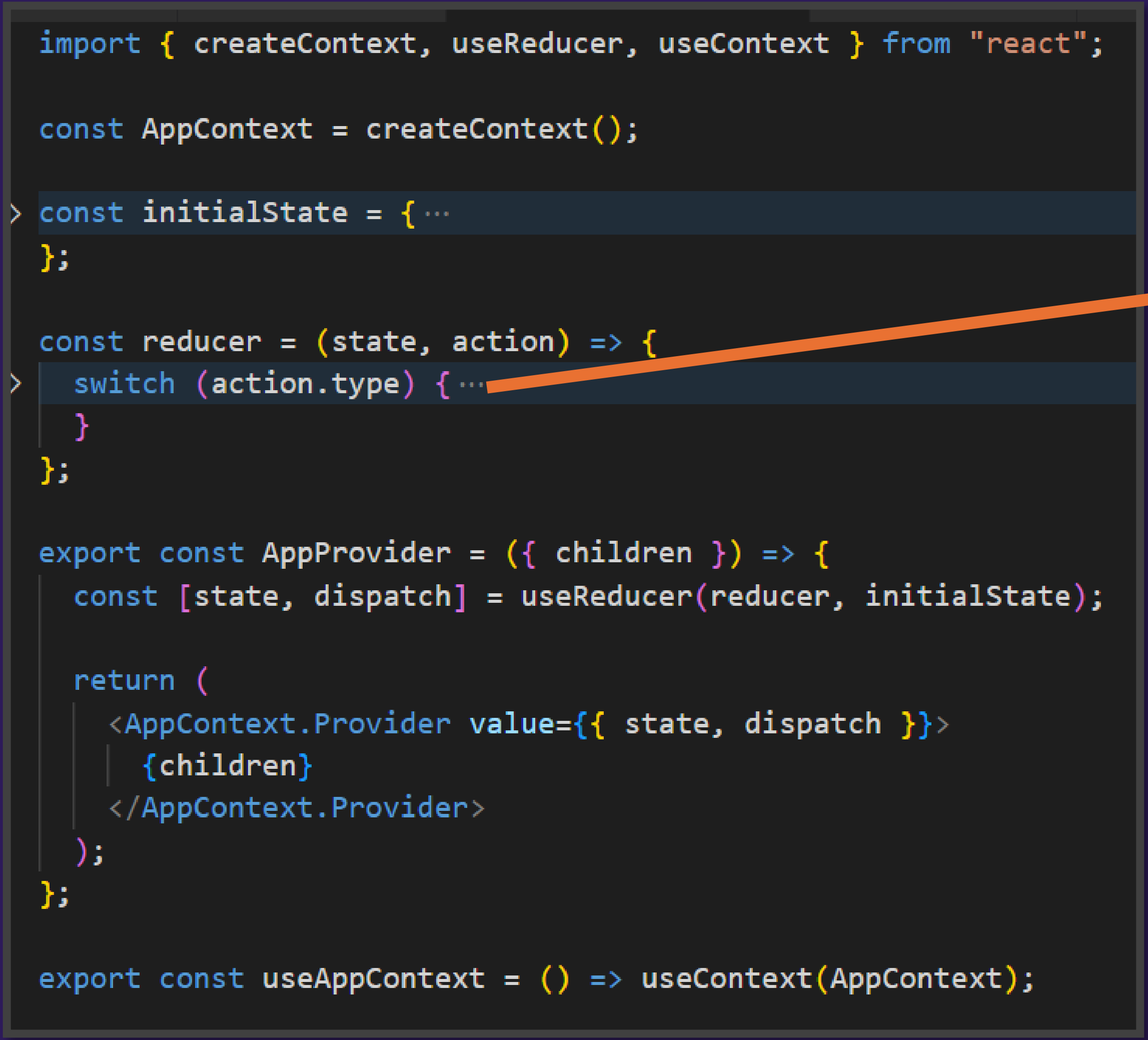
Advanced State Control

M

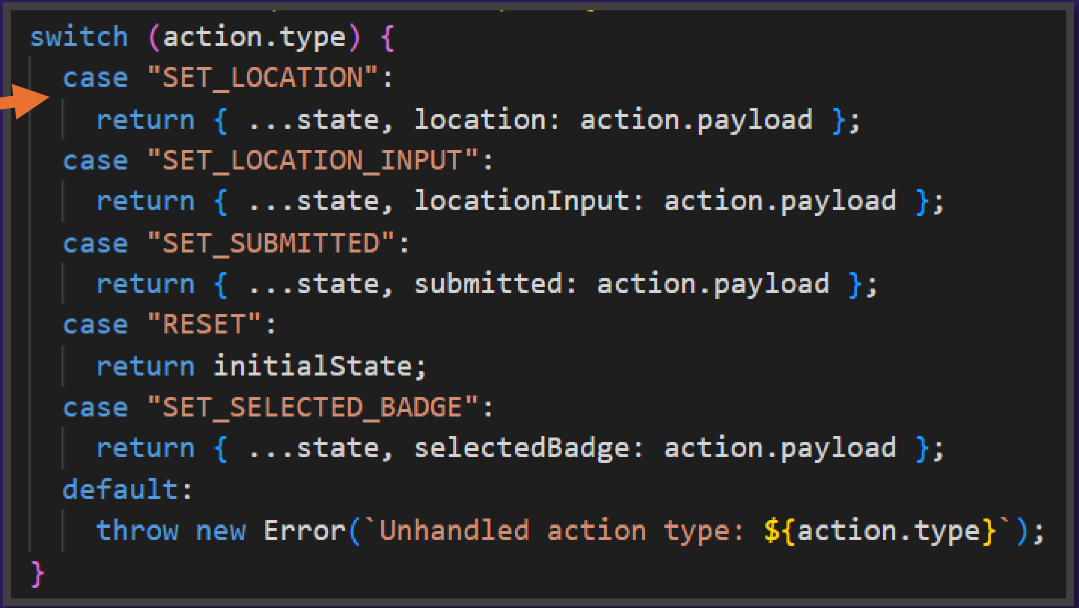
E

S

Advanced State Control



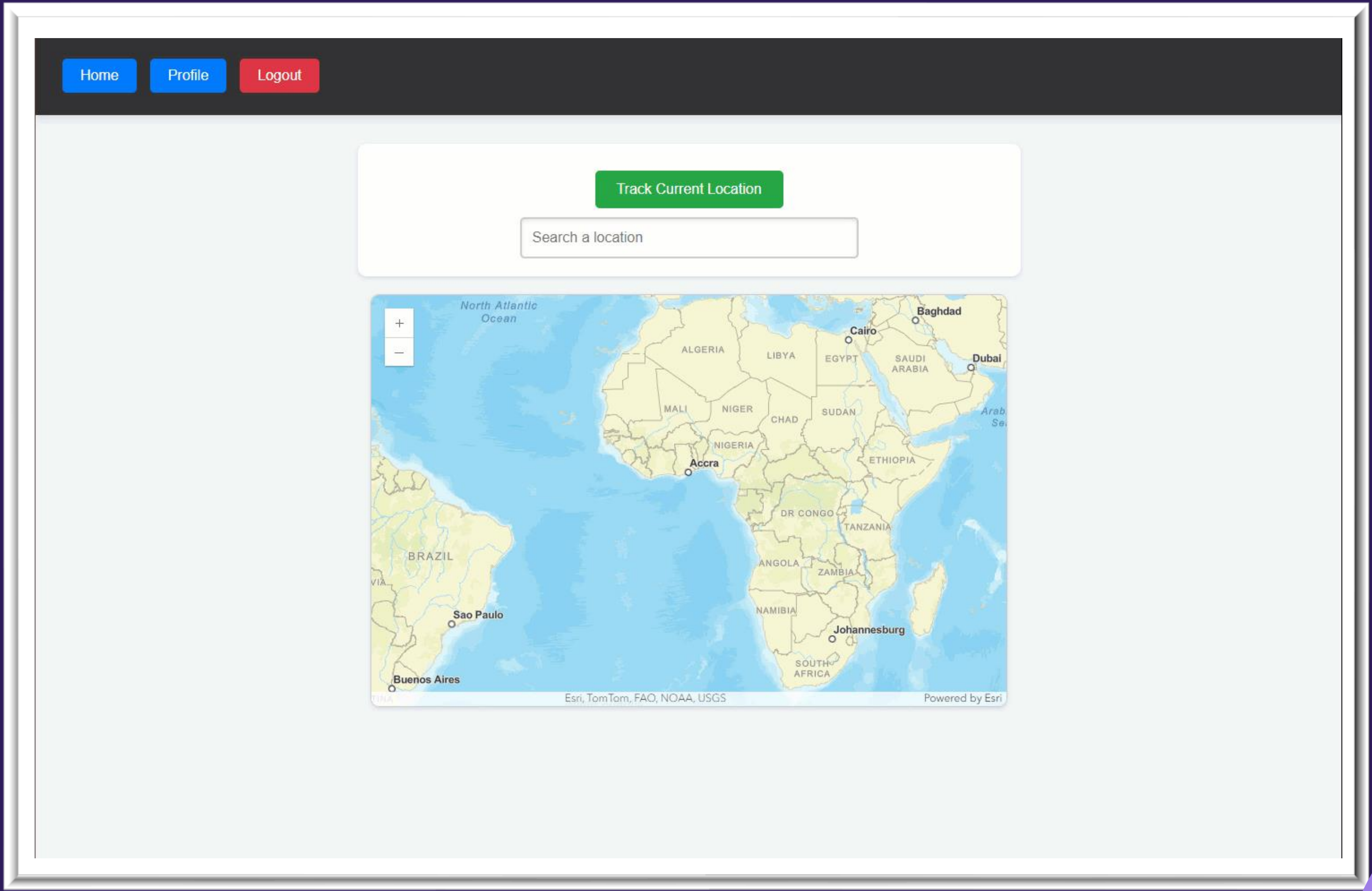
```
import { createContext, useReducer, useContext } from "react";

const AppContext = createContext();

const initialState = {⋯
};

const reducer = (state, action) => {
  switch (action.type) {⋯
  }
};

export const AppProvider = ({ children }) => {
  const [state, dispatch] = useReducer(reducer, initialState);

  return (
    <AppContext.Provider value={{ state, dispatch }}>
      {children}
    </AppContext.Provider>
  );
};

export const useAppContext = () => useContext(AppContext);
```



```
switch (action.type) {
  case "SET_LOCATION":
    return { ...state, location: action.payload };
  case "SET_LOCATION_INPUT":
    return { ...state, locationInput: action.payload };
  case "SET_SUBMITTED":
    return { ...state, submitted: action.payload };
  case "RESET":
    return initialState;
  case "SET_SELECTED_BADGE":
    return { ...state, selectedBadge: action.payload };
  default:
    throw new Error(`Unhandled action type: ${action.type}`);
}
```

Advanced State Control

```
const handleStartQuest = () => {
  if (questEnabled) {
    setQuestStarted(true);
  }
};

const handleEndQuest = () => {
  setQuestStarted(false);
  // Reset other quest-related states
};

// UI elements controlled by questStarted
{questStarted && (
  <button onClick={handleEndQuest}>
    End Quest
  </button>
)}
```



G

Gamified UI Components

A

Advanced State Control

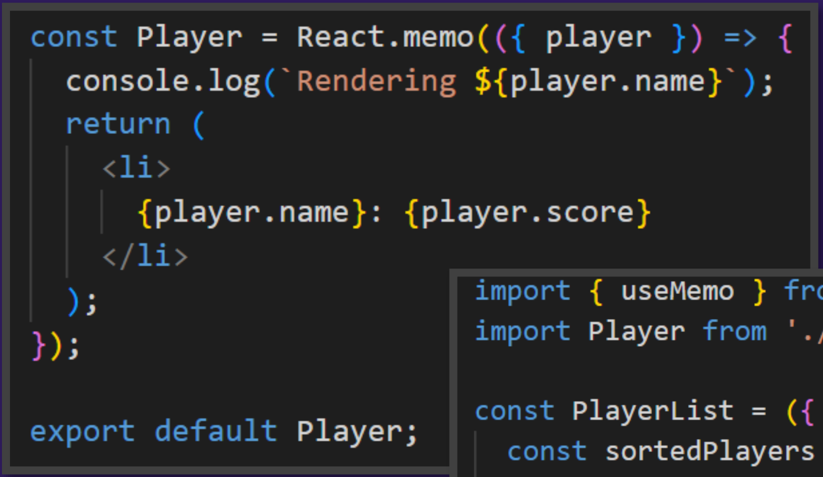
M

Memoization Techniques … to evolve into **M**odern Optimization

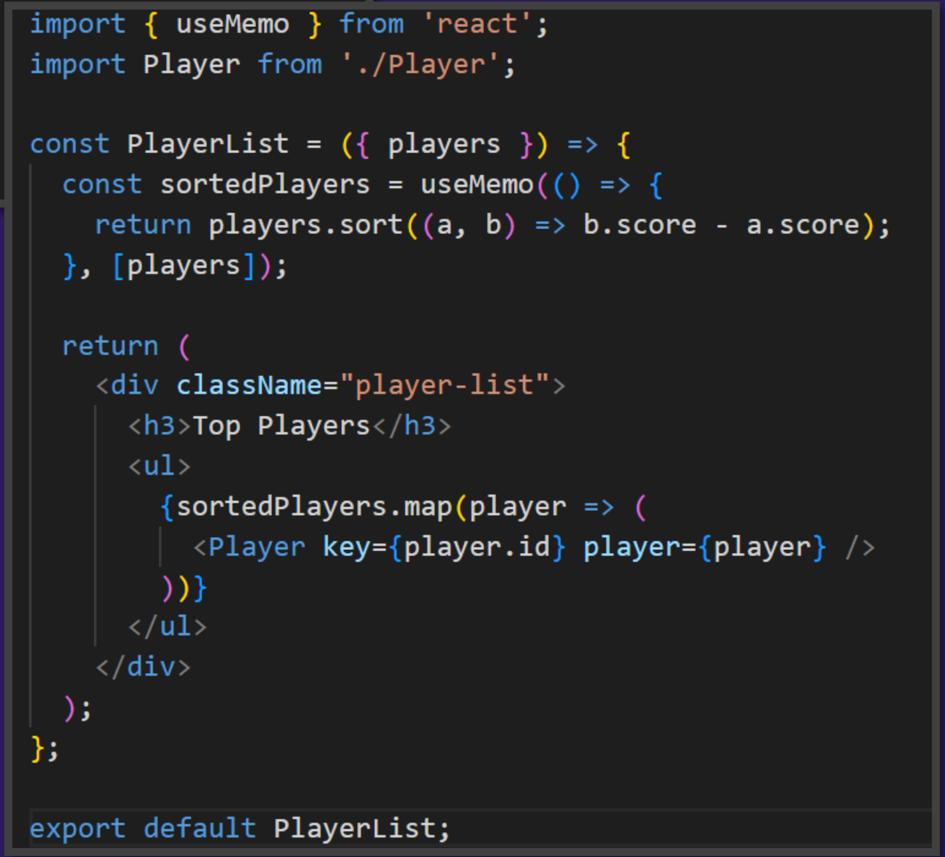
E

S

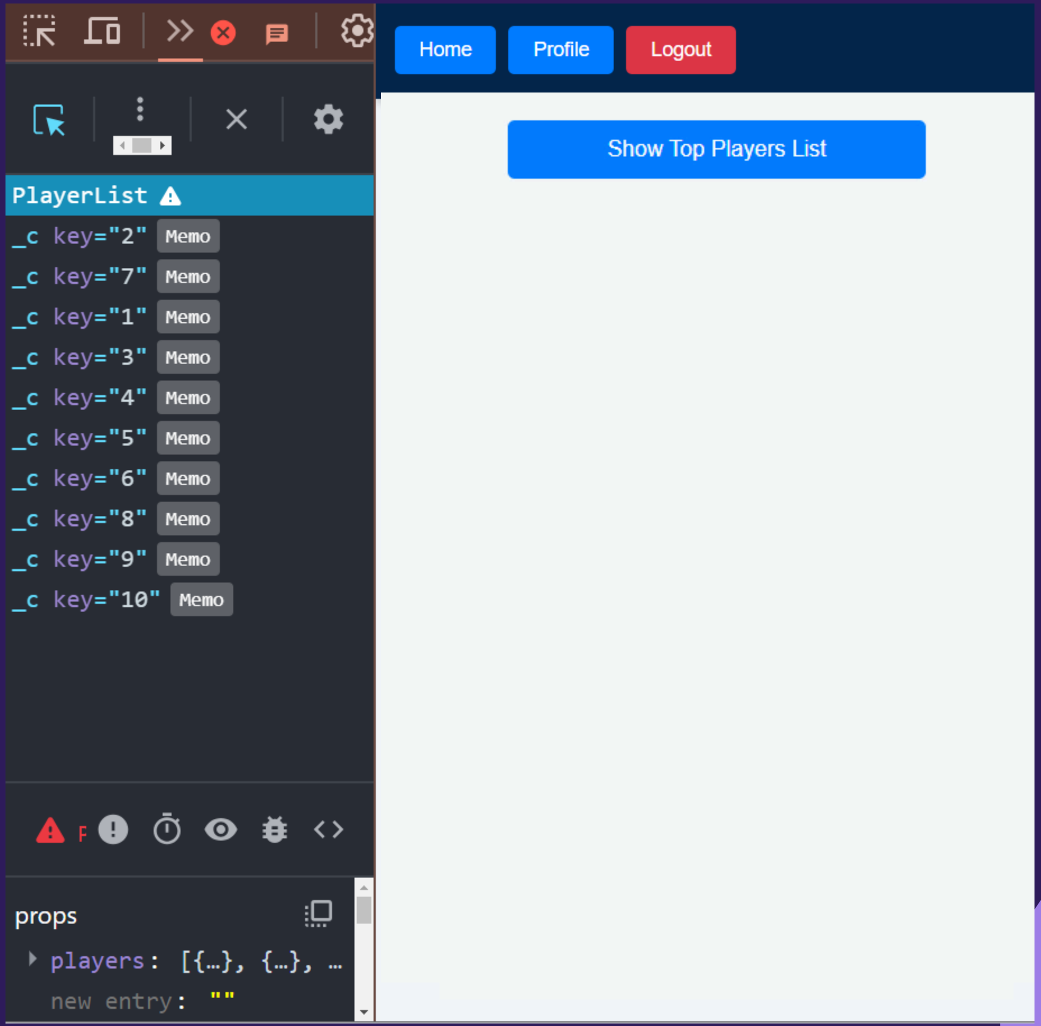
Memoization Techniques/Modern Optimization



```
const Player = React.memo(({ player }) => {
  console.log(`Rendering ${player.name}`);
  return (
    <li>
      {player.name}: {player.score}
    </li>
  );
});

export default Player;
```



```
import { useMemo } from 'react';
import Player from './Player';

const PlayerList = ({ players }) => {
  const sortedPlayers = useMemo(() => {
    return players.sort((a, b) => b.score - a.score);
  }, [players]);

  return (
    <div className="player-list">
      <h3>Top Players</h3>
      <ul>
        {sortedPlayers.map(player => (
          <Player key={player.id} player={player} />
        ))}
      </ul>
    </div>
  );
};

export default PlayerList;
```

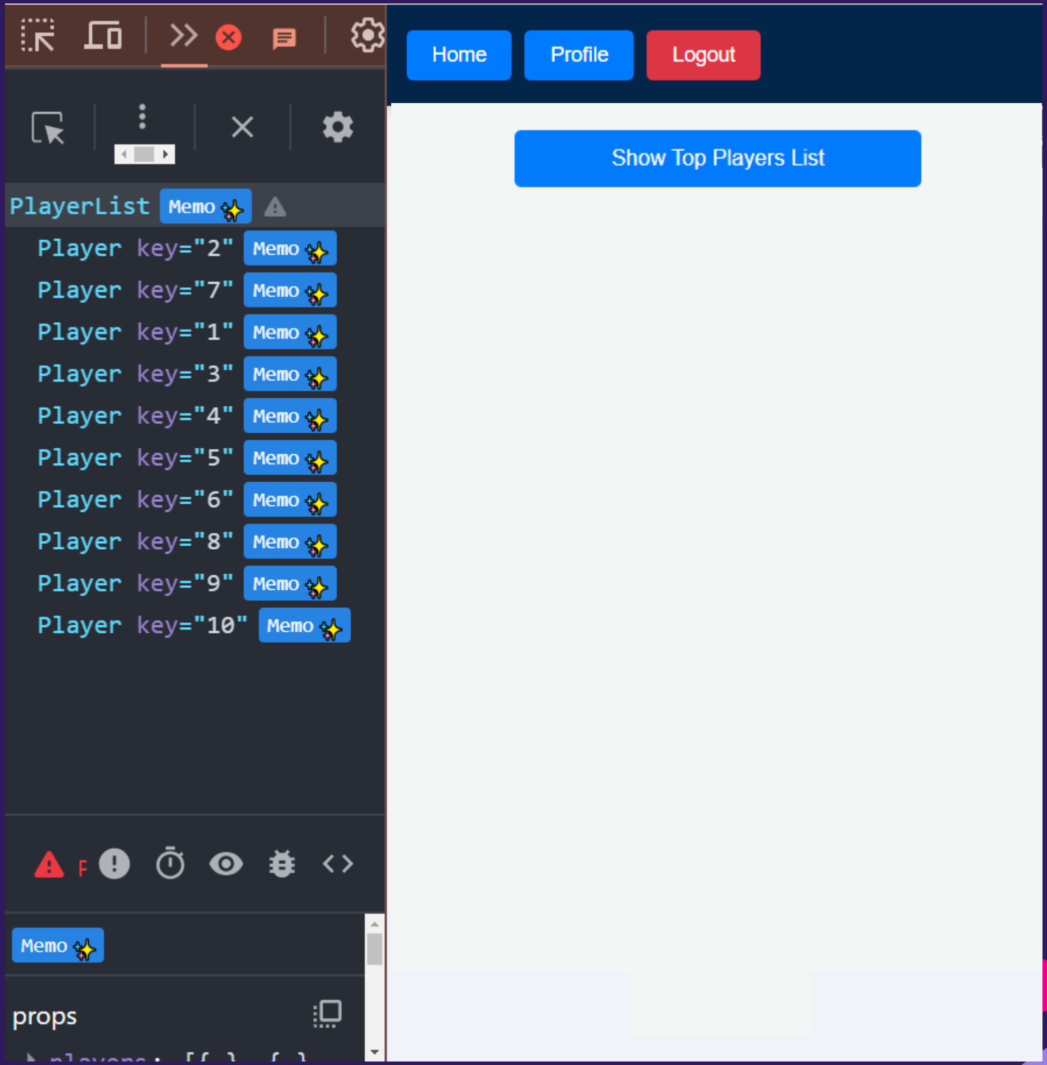


```
PlayerList ⚠
_c key="2" Memo
_c key="7" Memo
_c key="1" Memo
_c key="3" Memo
_c key="4" Memo
_c key="5" Memo
_c key="6" Memo
_c key="8" Memo
_c key="9" Memo
_c key="10" Memo

props
▸ players: [{…}, {…}, …
  new entry: ""
```

Memoization Techniques/Modern Optimization

```
import { ~~useMemo~~ } from 'react';
import Player from './Player';

const PlayerList = ({ players }) => {
  const sortedPlayers = ~~useMemo(~~() => {
    return players.sort((a, b) => b.score - a.score);
  }, ~~[players])~~;
```

```
const Player = ~~React.memo(~~({ player }) => {
  console.log(`Rendering ${player.name}`);
  return (
    <li>
      {player.name}: {player.score}
    </li>
```



```
PlayerList Memo
  Player key="2" Memo
  Player key="7" Memo
  Player key="1" Memo
  Player key="3" Memo
  Player key="4" Memo
  Player key="5" Memo
  Player key="6" Memo
  Player key="8" Memo
  Player key="9" Memo
  Player key="10" Memo

Memo
props
```

G

Gamified UI Components

A

Advanced State Control

M

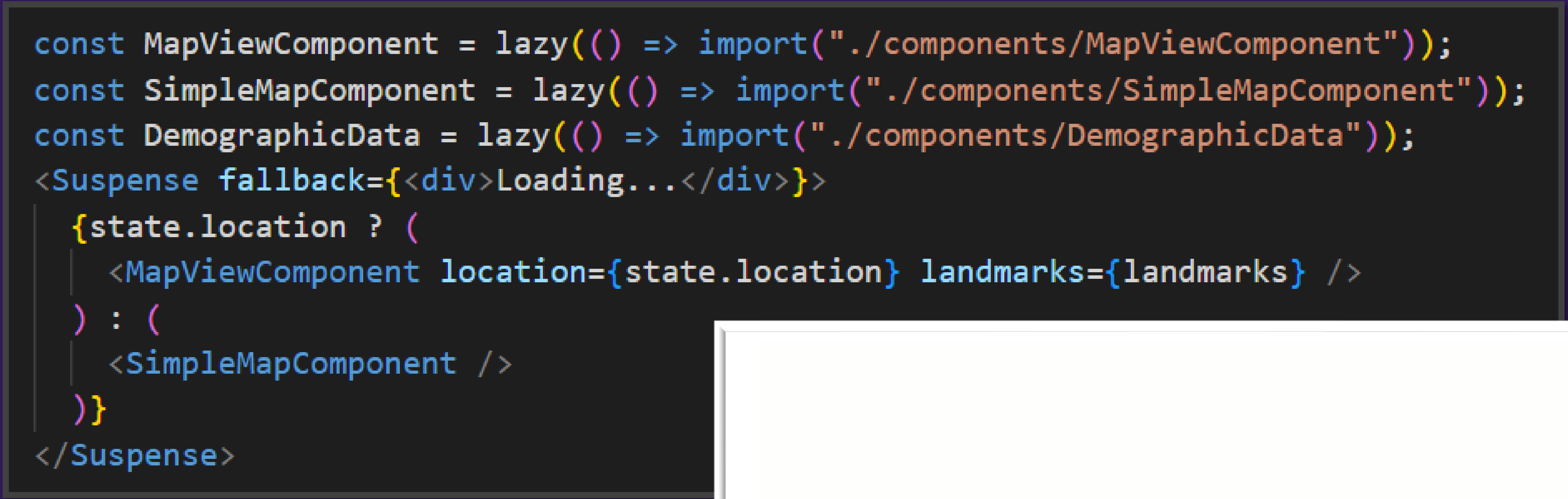
Memoization Techniques … to evolve into **M**odern Optimization

E

Efficient Rendering

S

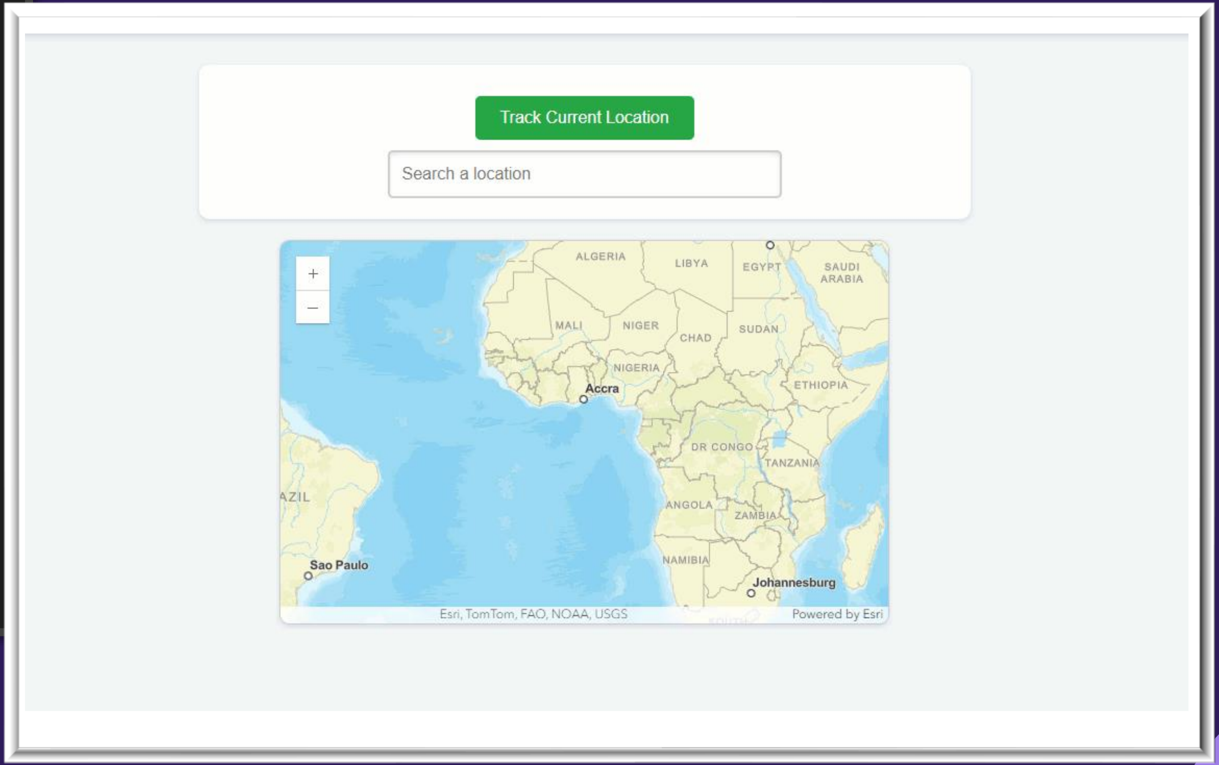
Efficient Rendering



```
const MapViewComponent = lazy(() => import("./components/MapViewComponent"));
const SimpleMapComponent = lazy(() => import("./components/SimpleMapComponent"));
const DemographicData = lazy(() => import("./components/DemographicData"));
<Suspense fallback={<div>Loading...</div>}>
  {state.location ? (
    <MapViewComponent location={state.location} landmarks={landmarks} />
  ) : (
    <SimpleMapComponent />
  )}
</Suspense>
```

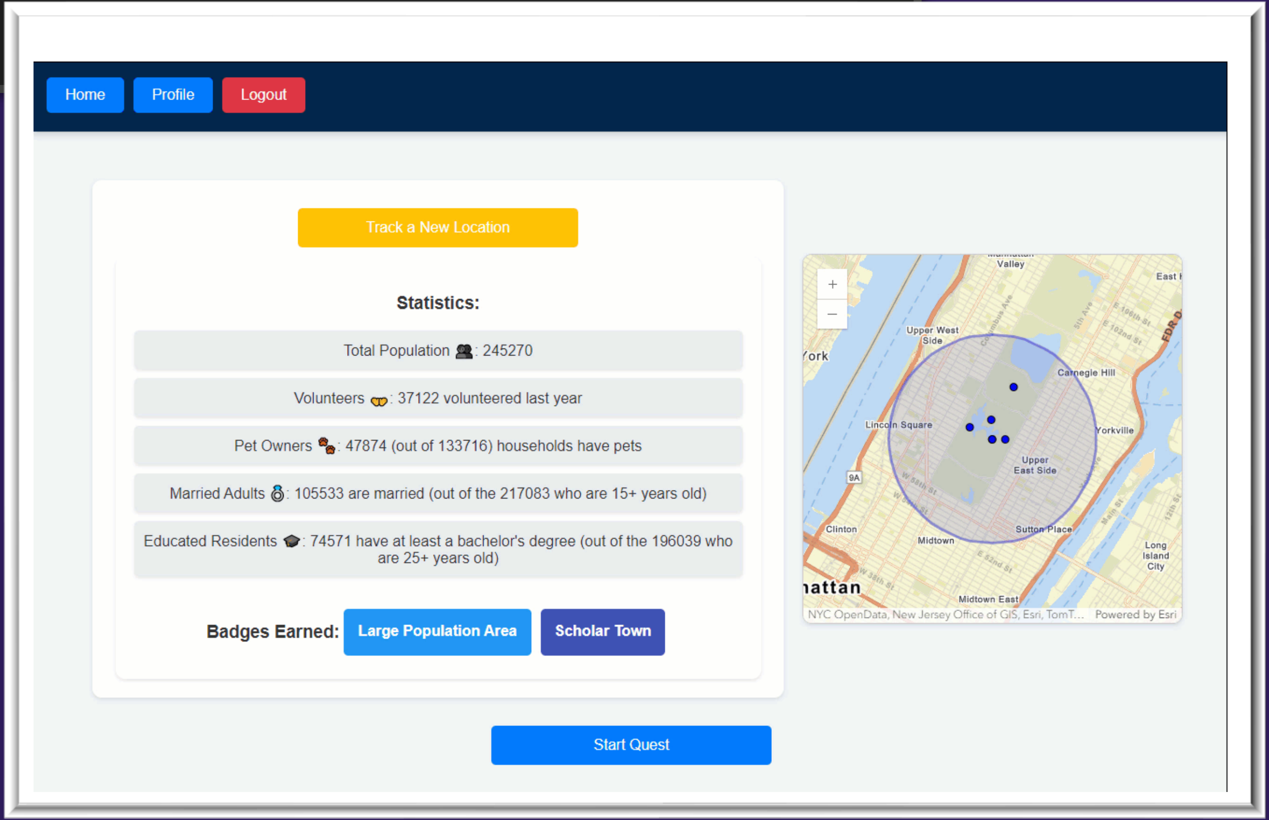
Efficient Rendering

```
useEffect(() => {
  if (!location || !mapDiv.current) return;

  const map = new Map({ basemap: 'streets' });
  const view = new MapView({
    container: mapDiv.current,
    map: map,
    center: [location.longitude, location.latitude],
    zoom: 12,
  });

  return () => view.destroy();
}, [location, landmarks]);
```



Efficient Rendering

```
{showLeaderboard && <Leaderboard />}
{selectedBadge && (
  <BadgeModal
    badge={selectedBadge}
    onClose={() => dispatch({ type: 'SET_SELECTED_BADGE', payload: null })}
  />
)}
```



Statistics:

Total Population 👥: 245270

Volunteers 🤝: 37122 volunteered last year

Pet Owners 🐾: 47874 (out of 133716) households have pets

Married Adults 💍: 105533 are married (out of the 217083 who are 15+ years old)

Educated Residents 🎓: 74571 have at least a bachelor's degree (out of the 196039 who are 25+ years old)

Badges Earned: Large Population Area Scholar Town

G

Gamified UI Components

A

Advanced State Control

M

Memoization Techniques … to evolve into **M**odern Optimization

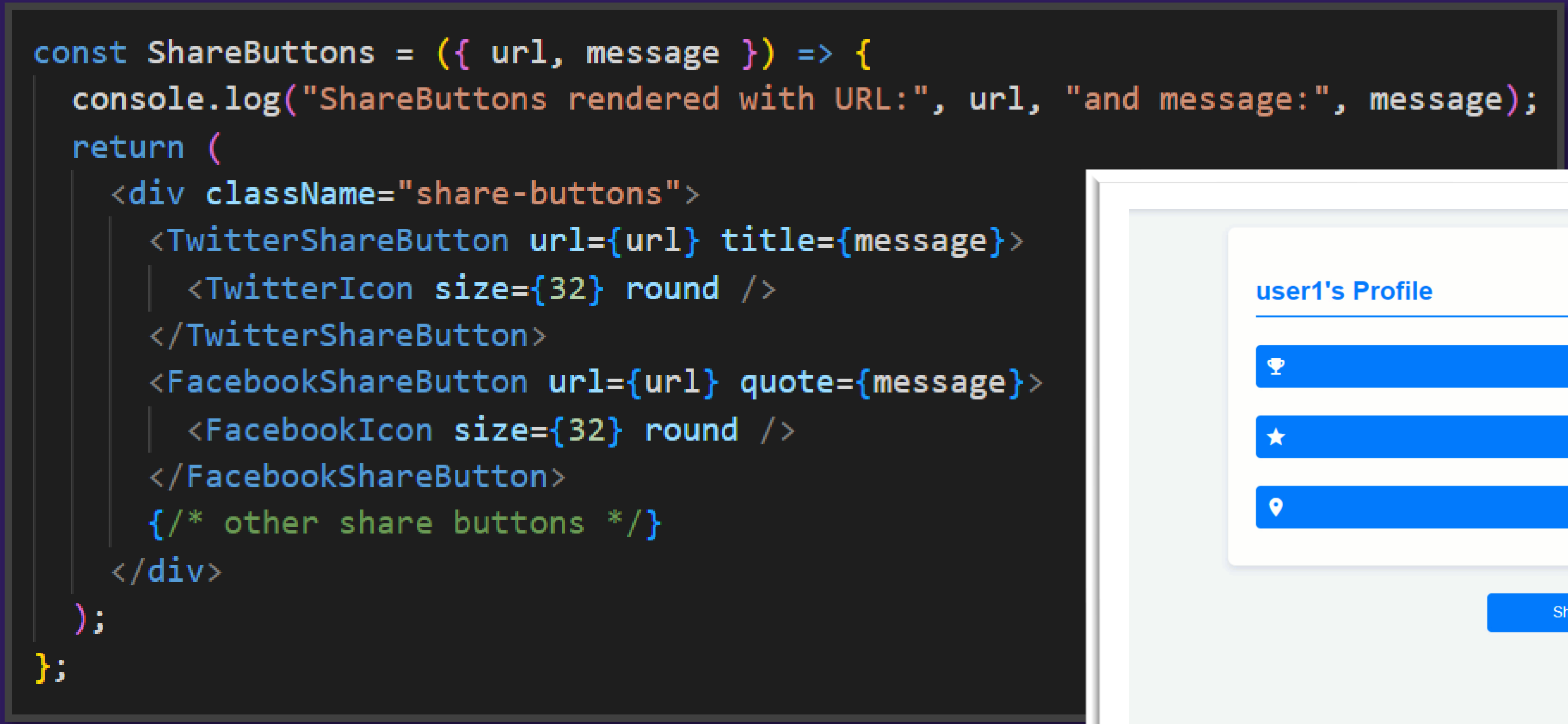
E

Efficient Rendering

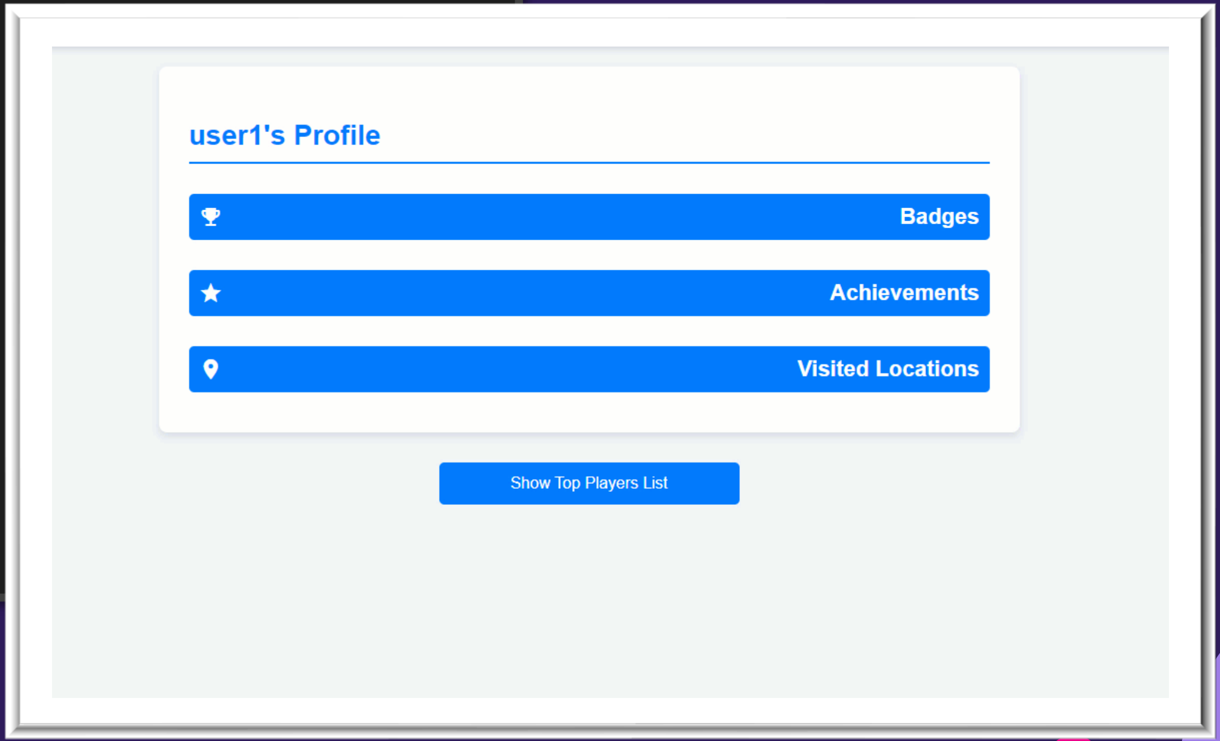
S

Social Interaction

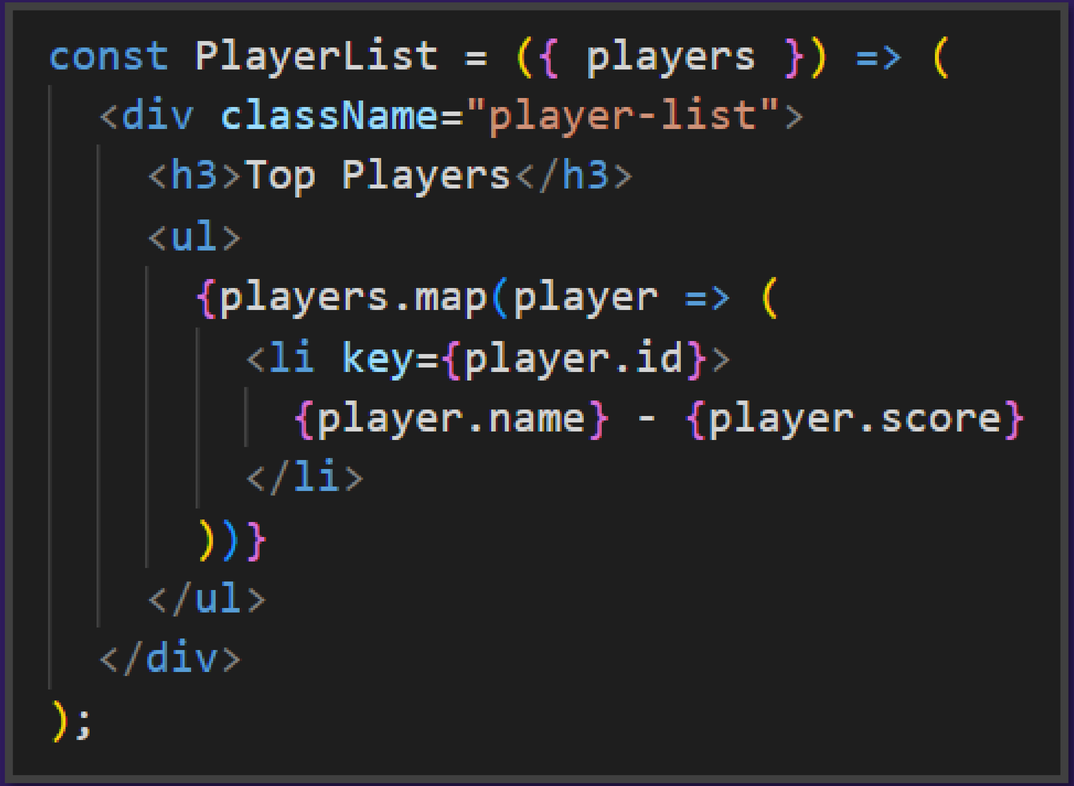
Social Interaction



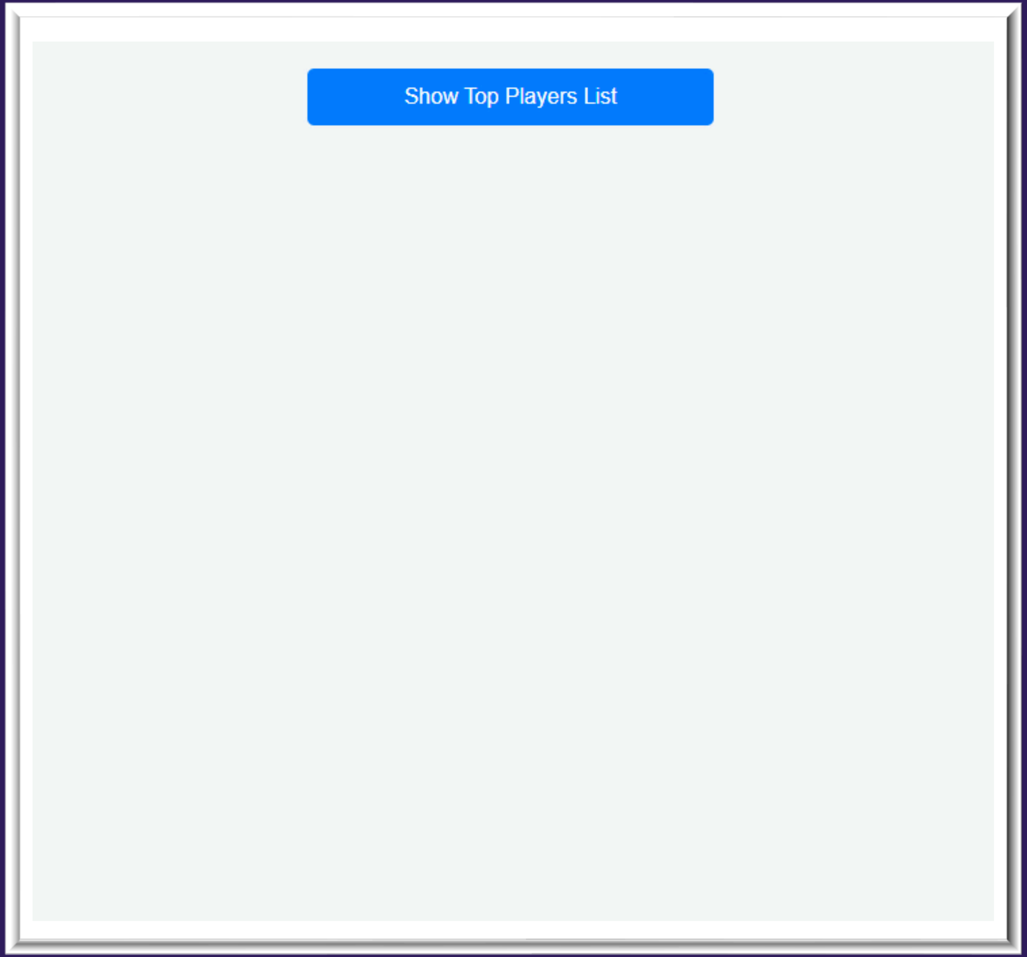
```
const ShareButtons = ({ url, message }) => {
  console.log("ShareButtons rendered with URL:", url, "and message:", message);
  return (
    <div className="share-buttons">
      <TwitterShareButton url={url} title={message}>
        <TwitterIcon size={32} round />
      </TwitterShareButton>
      <FacebookShareButton url={url} quote={message}>
        <FacebookIcon size={32} round />
      </FacebookShareButton>
      {/* other share buttons */}
    </div>
  );
};
```



Social Interaction



```
const PlayerList = ({ players }) => (
  <div className="player-list">
    <h3>Top Players</h3>
    <ul>
      {players.map(player => (
        <li key={player.id}>
          {player.name} - {player.score}
        </li>
      ))}
    </ul>
  </div>
);
```



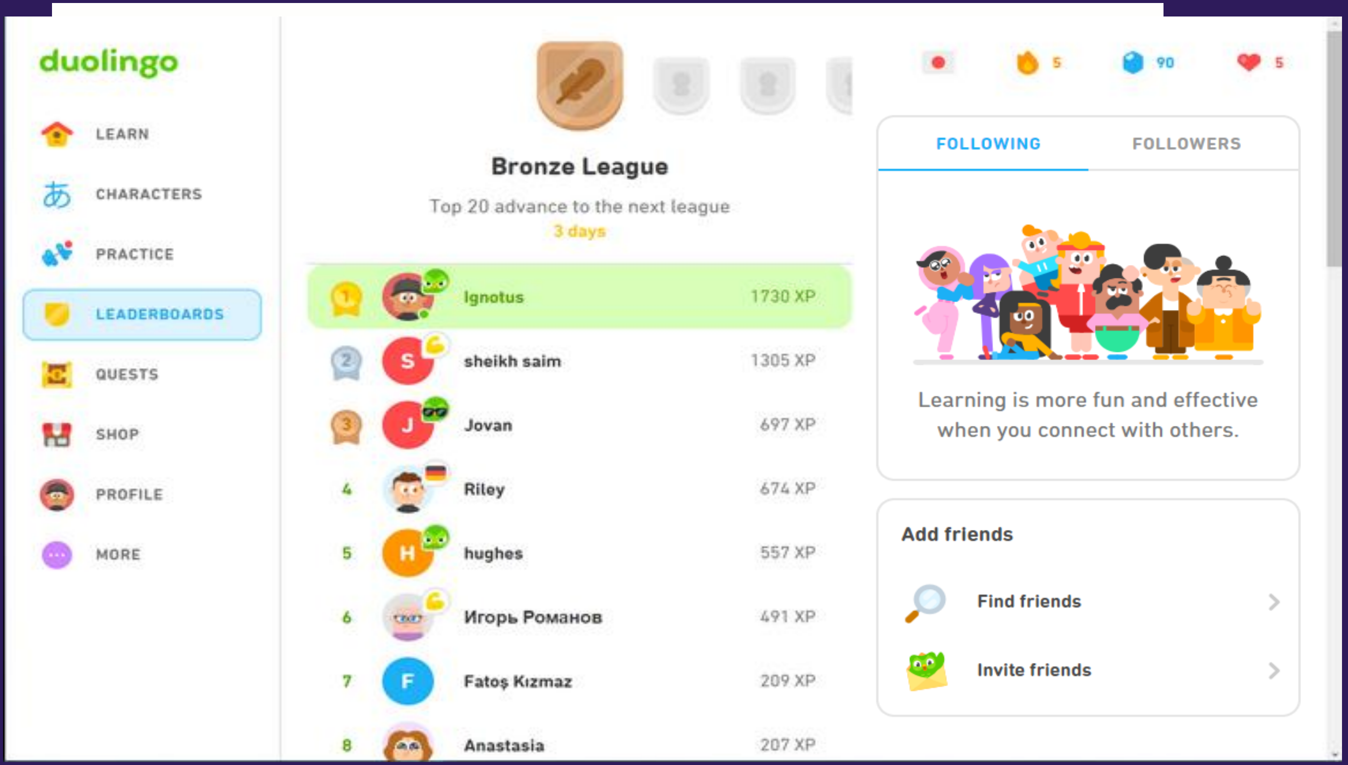
G Streak Counters & XP Bars

A Adaptive Learning System

M Optimized Lesson Rendering

E Efficient Component Rendering

S Leaderboards & Challenges


duolingo

LEARN
CHARACTERS
PRACTICE
LEADERBOARDS
QUESTS
SHOP
PROFILE
MORE

5 90 5

Bronze League

Top 20 advance to the next league

3 days

1	Ignotus	1730 XP
2	sheikh saim	1305 XP
3	Jovan	697 XP
4	Riley	674 XP
5	hughes	557 XP
6	Игорь Романов	491 XP
7	Fatoş Kızmaz	209 XP
8	Anastasia	207 XP

FOLLOWING FOLLOWERS

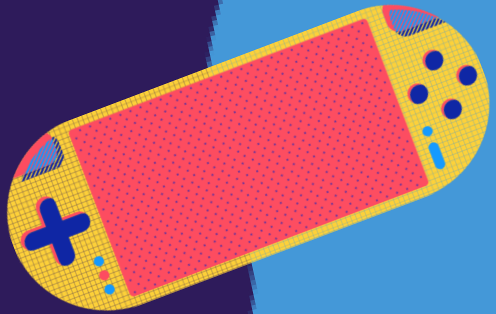
Learning is more fun and effective when you connect with others.

Add friends

Find friends

Invite friends

GAMES



Thank you, React Rally!

Courtney Yatteau

@c_yatteau

courtneyyatteau

bit.ly/Gamification-React-Rally-2024

esri THE SCIENCE OF WHERE®