

Session 7 — Building Complex Interactive Components

Creating the Quiz Experience

You're about to build the heart of your trivia game — interactive quiz components that bring your cached questions to life! This guide walks you through component composition, array mapping patterns, and creating dynamic user feedback systems. Ready to transform your static zones into engaging quiz experiences? Let's go!

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Access Your Codespace

Visit github.com/codespaces to relaunch your Codespace from Session 6.

Understanding Component Composition

Before we start coding, let's understand how complex components are built from smaller pieces — the foundation of scalable React architecture.

Component composition is like building with LEGO blocks — you create complex structures by snapping together smaller, focused pieces. Your QuizModal is actually composed of five smaller components working together:

```
QuizModal (the container)
├── ProgressHeader (shows question progress)
├── QuestionHeader (displays the question)
├── AnswerChoices (interactive answer buttons)
├── AnswerFeedback (shows results)
└── ContinueButton (navigation control)
```

💡 Why This Matters

Component composition is how professional React apps stay organized and maintainable. Instead of one massive component doing everything, you break functionality into focused pieces. Each component has a single responsibility, making your code easier to understand, test, and modify.

🎮 Adding the QuizModal to Your Game

Let's connect your quiz modal to the game flow so clicking zones actually shows quiz questions.

1. **Open** `src/App.jsx` and add the QuizModal import at the top:

```
import QuizModal from "../components/QuizModal";
```

2. **Access the quiz visibility state** by updating the useGame destructuring:

```
const { screen, isQuizVisible } = useGame();
```

3. **Add conditional rendering** for the QuizModal inside the PLAYING screen section:

```
{screen === SCREENS.PLAYING && (
  <
    <GameMap />
    <HUD />
    {isQuizVisible && <QuizModal />}
    <CoordinateDisplay />
  </>
)}
```

4. **Open** `src/components/GameMap.jsx` and add the quiz visibility setter:

```
const { activeZone, loadQuestionsForZone, setIsQuizVisible, zoneProgress } = useGame();
```

5. **Update the handleZoneClick function** to show the quiz modal after loading questions:

```
await loadQuestionsForZone(zoneId);
setIsQuizVisible(true);
```

6. **Test the connection:** Click a zone → QuizModal should appear with your cached questions!

💡 Why This Matters

Conditional rendering with `&&` is a React pattern that shows components only when certain conditions are true. When `isQuizVisible` is true, the QuizModal renders; when false, nothing renders. This pattern controls what users see based on app state.

🔵 Building the AnswerChoices Component

Now let's build the interactive answer buttons that transform your question data into clickable choices.

1. **Open** `src/components/QuizModal.jsx` and find the QuestionHeader function
2. **Add the AnswerChoices component** after the QuestionHeader function:

```
function AnswerChoices({ answers }) {
  return <div className="answers-grid"></div>;
}
```

3. **Add the component to the JSX** (right after `<QuestionHeader question={question} />`):

```
<AnswerChoices answers={question.answers} />
```

4. **Test the basic structure:** Click zone → React DevTools → Find AnswerChoices → Confirm answers prop is populated

💡 Why This Matters

Starting with a simple component structure and testing early helps you catch issues before adding complexity. The **answers prop** contains the array of possible choices that you'll transform into interactive buttons.

🌐 Understanding Array Mapping Patterns

Let's understand how to transform arrays of data into arrays of JSX elements — a fundamental React pattern.

Array mapping is the process of transforming each item in an array into something else. In React, you often map data arrays into JSX element arrays:

```
// Data array
const answers = ["React", "Vue", "Angular", "Svelte"];

// Map to JSX elements
const buttons = answers.map((answer, index) => (
  <button key={index}>{answer}</button>
));
```

The Key Prop Requirement

React needs a unique **key prop** for each mapped element to track changes efficiently:

```
{answers.map((answer, index) => (
  <button key={index} className="answer-button">
    {answer}
  </button>
))}
```

💡 Why This Matters

Array mapping is everywhere in React — any time you have a list of data that becomes a list of components, you use `map()`. The **key prop** helps React optimize updates by tracking which items changed, moved, or were added/removed.

1. **Update AnswerChoices** to render buttons for each answer:

```
function AnswerChoices({ answers }) {
  return (
    <div className="answers-grid">
      {answers.map((answer, index) => (
        <button key={index} className="answer-button">
          {answer}
        </button>
      ))}
    </div>
  );
}
```

2. **Test the mapping:** Click zone → You should see answer buttons appear in the modal

🎨 Adding Dynamic Styling with Conditional Classes

Let's add click functionality and dynamic styling that shows correct/incorrect answers with visual feedback.

1. Add click handling and props to AnswerChoices:

```
function AnswerChoices({ answers, onAnswerClick, chosenAnswer, correctAnswer }) {  
  const getButtonStyle = (answerIndex) => {  
    if (chosenAnswer === null) return "answer-button";  
    if (answerIndex === correctAnswer) return "answer-button correct";  
    if (answerIndex === chosenAnswer) return "answer-button incorrect";  
    return "answer-button";  
  };  
  
  return (  
    <div className="answers-grid">  
      {answers.map((answer, index) => (  
        <button  
          key={index}  
          className={getButtonStyle(index)}  
          onClick={() => onAnswerClick(index)}  
          disabled={chosenAnswer !== null}  
        >  
          {answer}  
        </button>  
      ))}  
    </div>  
  );  
}
```

2. Update the component usage with all required props:

```
<AnswerChoices  
  answers={question.answers}  
  onAnswerClick={handleAnswerClick}  
  chosenAnswer={chosenAnswer}  
  correctAnswer={question.correct}  
>
```

3. Test the interactivity: Click zone → Click answer → Different styling for correct vs incorrect

Why This Matters

Conditional styling provides immediate visual feedback to users. The `getButtonStyle` function returns different CSS classes based on the current state, and the `disabled` attribute prevents multiple clicks after an answer is selected.



Creating Custom Feedback Messages

Let's add personality to your game with custom feedback messages that celebrate correct answers and encourage players after mistakes.

1. **Create the messages file:** Right-click `src/constants` → New File → name it `messages.js`
2. **Add feedback message arrays:**

```
export const CORRECT_FEEDBACK = [  
  "🎯 Nailed it!",  
  "🔥 You got it!",  
  "✨ Awesome!",  
  "🏆 Perfect!",  
  "💯 Brilliant!",  
  "★ Outstanding!",  
  "🚀 Amazing!"  
];  
  
export const INCORRECT_FEEDBACK = [  
  "😞 Missed it!",  
  "💥 Not quite!",  
  "😓 Close one!",  
  "😬 Try again!",  
  "🎯 Almost there!",  
  "💪 Keep going!",  
  "🧠 Learning time!"  
];
```

3. **Import the constants** into QuizModal.jsx:

```
import { CORRECT_FEEDBACK, INCORRECT_FEEDBACK } from "../constants/messages";
```



Why This Matters

Constants keep your feedback messages organized and easy to modify. By storing them in a separate file, you can easily add new messages or change the tone without hunting through component code.



Bonus Challenge

Add more feedback messages to each array to increase variety! Try different emojis and encouraging phrases.



Implementing Random Message Selection

Now let's make your feedback dynamic by randomly selecting messages from your arrays using JavaScript's built-in Math methods.

1. Find the **AnswerFeedback** function in QuizModal.jsx
2. Replace the placeholder message with random selection logic:

```
function AnswerFeedback({ hasAnswered, isCorrect, correctAnswerText }) {  
  if (!hasAnswered) {  
    return <AnswerPlaceholder />;  
  }  
  
  const messages = isCorrect ? CORRECT_FEEDBACK : INCORRECT_FEEDBACK;  
  const message = messages[Math.floor(Math.random() * messages.length)];  
  
  return (  
    <div className="result">  
      <strong>{message}</strong>  
      {!isCorrect && <div>The answer was: {correctAnswerText}</div>}  
    </div>  
  );  
}
```

3. Test the randomization: Click zone → Click answers → See different messages each time

Random Selection Breakdown

```
const messages = isCorrect ? CORRECT_FEEDBACK : INCORRECT_FEEDBACK;  
// Choose the right array based on whether answer was correct  
  
const message = messages[Math.floor(Math.random() * messages.length)];  
// Math.random() → 0 to 0.999...  
// * messages.length → 0 to array length  
// Math.floor() → Round down to whole number  
// messages[index] → Get message at that position
```



Why This Matters

Random selection adds variety and personality to your game. `Math.random()` generates decimal numbers between 0 and 1, `Math.floor()` rounds down to integers, and array indexing selects the message. This pattern is used in games, animations, and any app that needs variety.



Testing Your Complete Quiz Experience

Let's test your complete quiz system and verify all the interactive pieces work together.

Complete Quiz Flow Test

1. **Navigate to game:** Click "Start Adventure"
2. **Click a zone:** Modal should appear with question and answers
3. **Click an answer:**
 - Button should show correct/incorrect styling
 - Random feedback message should appear
 - Other buttons should be disabled
 - Continue button should become enabled
4. **Click Continue:** Next question should load
5. **Complete all questions:** Modal should close and zone should be marked complete

React DevTools Inspection

1. **Open DevTools:** Press F12 → Components tab
2. **Find QuizModal:** Examine the component tree
3. **Inspect AnswerChoices:** Check answers prop and chosenAnswer state
4. **Watch state changes:** Click answers and observe chosenAnswer updates




Why This Matters









End-to-end testing ensures all your components work together correctly. By testing the complete user flow, you catch integration issues that might not appear when testing individual components.



Essential Terms

Quick reference for all the component composition and interaction concepts you just learned:

Term	Definition	Why it matters
 component composition	Building complex components by combining smaller, focused components together.	Your QuizModal is composed of five smaller components, making it easier to understand and maintain.

 <code>Array.map()</code>	JavaScript method that transforms each item in an array into something else, returning a new array.	Essential for converting your answers array into JSX button elements in React.
 key prop	Unique identifier React needs for each element in a mapped array to track changes efficiently.	Helps React optimize updates when answer lists change or reorder.
 conditional rendering	Showing different components or content based on state or props using JavaScript expressions.	Controls when the QuizModal appears and what styling buttons receive.
 conditional styling	Applying different CSS classes based on component state or props.	Provides visual feedback showing correct/incorrect answers with different colors.
 <code>Math.floor()</code>	JavaScript method that rounds decimal numbers down to the nearest integer.	Used with <code>Math.random()</code> to select random array indices for feedback messages.
 <code>Math.random()</code>	JavaScript method that generates random decimal numbers between 0 and 1.	Creates variety in feedback messages by selecting random array elements.
 constants	Static values stored in separate files to prevent typos and improve maintainability.	Your feedback message arrays are constants that can be easily modified without touching component code.
 event handling	Managing user interactions like clicks, form submissions, and keyboard input in React components.	Your answer buttons use <code>onClick</code> handlers to trigger state changes and provide interactivity.



Ask the AI — Component Composition Mastery

You just built a complex interactive quiz system using component composition, array mapping, and dynamic styling — excellent work!

Now let's deepen your understanding of React patterns, component architecture, and user interaction design. Here are the most impactful questions to ask your AI assistant about today's session:

- **How does component composition make React apps more maintainable than monolithic components?**
 - **Why does React require key props when mapping arrays to JSX elements?**
 - **How do conditional classes provide better user experience than static styling?**
 - **What makes `Math.random()` and `Math.floor()` work together for array selection?**
 - **How does the `disabled` attribute improve the user experience in quiz interfaces?**
 - **Why is it better to store feedback messages in constants rather than hardcoding them?**
 - **How does the `AnswerChoices` component demonstrate the single responsibility principle?**
-



Pro Tip:

Component composition is the secret to building scalable React applications. Think of each component as having one clear job — `AnswerChoices` handles answer display, `AnswerFeedback` handles result messaging. This separation makes your code easier to test, debug, and extend.