CS 499 Milestone Two Narrative

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## Artifact Description

The artifact I selected for this enhancement is my airline dispatcher application. The original version of this application was created earlier in my Computer Science program as part of a course project. It was built as a JavaScript React application that allowed employees to log in and navigate to pages based on their roles. At that time, the application had limited structure, minimal role handling, and was implemented without strong typing or a modern build system.  
  
For this milestone, I refactored the application into a TypeScript + Vite project, restructured the codebase into a more maintainable folder hierarchy, and added role-based access control (RBAC) through a GuardedRoute component. The updated artifact demonstrates improved software design, secure architecture, and modern engineering practices.

## Justification for Inclusion in ePortfolio

I selected this artifact because it represents my ability to take an existing application and modernize it using software engineering best practices. This project clearly showcases my skills in designing and implementing robust, secure, and maintainable code.  
  
By including this artifact in my ePortfolio, I am highlighting:  
- My ability to refactor a JavaScript application into a TypeScript codebase.  
- My understanding of modular design and folder structure for scalability.  
- My application of secure software design principles such as RBAC.  
  
These enhancements demonstrate my growth as a developer and align directly with my career goals in software engineering, where modernization and security are critical to success.

## Components Showcasing Skills

- AuthContext: Implemented a centralized authentication context to manage user state, demonstrating the use of design patterns.  
- GuardedRoute: Created a custom route component that enforces RBAC at the routing layer, showing secure design thinking.  
- Role and User types: Defined strict TypeScript types for roles and users, reducing bugs and improving maintainability.  
- Refactor to Vite + TypeScript: Migrated the project to Vite, demonstrating adoption of modern tooling for performance and DX.

## Improvements Made

The artifact was significantly improved in several ways:  
- Refactoring: Migrated from JavaScript to TypeScript, improving type safety and maintainability.  
- Structure: Reorganized into feature- and shared-based folders, separating concerns.  
- Security: Implemented RBAC using GuardedRoute, restricting access to dispatcher and gate agent views.  
- Scalability: Introduced context-based authentication as a foundation for future enhancements like token-based auth.

## Reflection on the Process

The process of enhancing and modifying the artifact helped me solidify several lessons:  
- Learning: I deepened my understanding of TypeScript’s type system, especially union types, the Record utility, and how typing improves safety. I also practiced secure software design by implementing RBAC.  
- Challenges: Handling imports/exports in TypeScript caused issues (e.g., missing export keyword errors). Another challenge was configuring React Router v6’s Navigate and useLocation for redirects. Debugging these improved my React skills.  
- Growth: I gained confidence in restructuring projects, adopting modern tools like Vite, and thinking about security during design rather than as an afterthought.

## Conclusion

This enhancement demonstrates progress toward competency in the Software Design and Engineering outcome of the Computer Science program. By refactoring the application into TypeScript, reorganizing the structure, and implementing RBAC, I demonstrated the ability to apply innovative tools and techniques to deliver maintainable and secure software solutions. This artifact is now a strong addition to my ePortfolio, representing both my technical skills and my ability to reflect on the engineering process.