Technological Requirements:

Technology Type	Name	Justification	Pros (advantages)	Cons (disadvantages)
Frontend Framework	JavaScript/HTML	JavaScript is versatile for building dynamic web applications, while HTML forms the structure of the front end.	Simple to use, widely supported, lightweight.	Requires additional libraries or frameworks (like React) for advanced functionalities.
CSS Framework	Bootstrap	Makes UI development faster by offering pre-designed components and a responsive grid system, which is perfect for building the Admin Dashboard.	Easy to use, responsive design by default, large community support.	Less modern than Material-UI, with limited customization without overrides.
Backend Framework	JavaScript	JavaScript is well-suited for backend development, ensuring consistency with the front end, while other languages (e.g., Python, PHP) can be used based on need.	Ensures consistency across the stack, and flexibility to choose other languages for specific tasks.	Lacks the robustness of backend-specific languages like Java for certain use cases.
Authentication Library	Passport.js	Ensures secure logins and manages role-based access for different users, such as admins, staff, and customers.	It supports various strategies (e.g., local, OAuth) and is easy to integrate with Express.js.	Requires configuration and learning of its middleware-based workflow.
Database	MySQL	A relational database system designed for structured data, ensuring clear relationships between entities such as orders and customers.	ACID compliance supports complex queries and joins, which are widely adopted.	Less flexible than NoSQL (like MongoDB) for handling unstructured data.
File System	Linux	Used for saving and writing files, especially for storing session variables or temporary application data.	Efficient for server-based environments like Linux.	Limited use if the application expands to require distributed or cloud-based storage.
Save Session Variables	Redis or Server-side Sessions	Redis is a fast in-memory data store that handles session variables, making it ideal for login and payment workflows.	Provides secure, fast session management with high scalability and persistence options.	Requires additional setup and may need database persistence for critical workflows.
Save Cache	Browser Storage (LocalStorage)	Browser-based storage like LocalStorage or SessionStorage can temporarily store user data for non-critical purposes, such as pre-filling usernames.	Improves user experience by reducing repetitive input and is easy to implement.	Not secure for sensitive data (e.g., passwords); storage is browser-dependent.

Prototyping Tool	Figma	Figma is a collaborative design tool that supports interactive UI/UX prototyping. It's ideal for creating mockups for the Sprint 4 Capstone Project.	Enables easy team collaboration, cloud-based sharing, and rich design features.	Limited use if the application expands to require distributed or cloud-based storage.
Cloud Hosting Provider	Gblearn or Azure	AWS offers flexible cloud infrastructure, providing reliability and scalability for hosting applications. It's a standard at the college with tools like Gblearn.	High uptime, scalability, and a pay-as-you-go pricing model.	It can become costly without proper cost management.
Programming Language	JavaScript	JavaScript is versatile and works across client and server-side development, ensuring consistency throughout the stack.	Widely used, with a large ecosystem and support from most frameworks.	Debugging can be challenging due to lost typing and its asynchronous nature.
REST API	Express.js RESTful API	Express.js handles communication between the front end and back end, and also, aligns with the stack used in the project, which already includes JavaScript.	Lightweight, easy to set up, and integrates well with Node.js.	Offers fewer built-in features compared to more complex frameworks like Django.
API Testing Tool	Postman	Makes API testing easier by helping users validate RESTful endpoints and test CRUD operations efficiently.	User-friendly, supports automated testing and is widely adopted.	Limited for complex automated workflows compared to JMeter.
CI/CD Tool	GitHub Actions/Linux	Automates testing, building, and deployment processes to maintain code quality and ensure smooth, consistent releases.	Integrated with GitHub, easy to configure, and supports custom workflows.	Limited advanced features compared to Jenkins or GitLab.
Version Control	GitHub	Enables code collaboration and versioning, allowing team members to track changes and work together seamlessly.	Powerful version control, easy collaboration, widely adopted.	Requires familiarity with Git commands for effective usage.
Analytics Tool	Google Analytics	Monitors user behaviour and offers valuable insights into how users interact with the application, helping improve the overall user experience.	Free, easy to set up, and provides detailed metrics for user behavior.	Privacy concerns if not configured properly (e.g., GDPR compliance).
Encryption Library	bcrypt	Secures sensitive data like passwords by hashing and salting before storage, ensuring user credentials are protected.	Strong encryption, easy to use with Node.js, widely adopted for securing credentials.	Computationally expensive, which may slow down performance for high-frequency operations.