

Justification for Three-Tier Layered Architecture

The Equipment Checkout System (ECS) will adopt a three-tier layered architecture to ensure a structured, maintainable design that meets performance, security, and scalability needs. This approach clearly separates the user interface, business logic, and data storage into distinct tiers for clarity and easier ongoing development. Additionally, the system will leverage NetBeans (for development), Java-based authentication (for authentication and authorization services), MySQL (for database storage), and a Windows Server platform (for hosting and deployment).

Tier Breakdown

1. Presentation Tier

- **Purpose:** Delivers the user interface for employees, supervisors, and IT staff. Emphasis is on a clean layout, straightforward data entry, and responsive feedback.
- **Implementation:** Built using Java in NetBeans, enabling a consistent and portable user experience that can run on a Windows Server environment or other compatible OS as needed.

2. Business Logic Tier

- **Purpose:** Centralizes the rules and processes for equipment checkout, return, notifications, and authentication. Ensures consistent policy enforcement across the system.
- **Implementation:** Developed in NetBeans and deployed on Windows Server, with Java-based authentication to manage user roles, permissions, and access control.

3. Data Tier

- **Purpose:** Stores all employee, equipment, and transaction records in a secure, organized database. Indexing and backup procedures help maintain reliability and ensure fast retrieval.
- **Implementation:** Uses MySQL, taking advantage of its stability, indexing features, and compatibility with Windows Server deployments.

Key Advantages

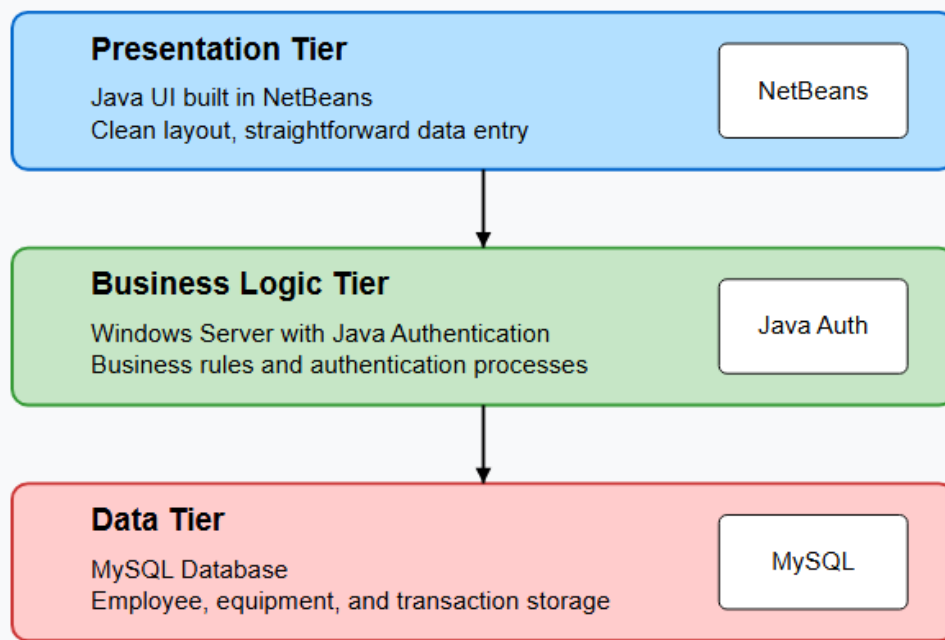
- **Straightforward Scalability:** Each tier (UI, business logic, data) can be deployed or expanded independently, allowing the system to handle increasing load.
- **Clear Separation of Concerns:** Rapid updates to the user interface, business rules, or database can be implemented without negatively impacting other tiers.
- **Enhanced Security:** A single point of responsibility for access control within the business logic tier reduces risk and simplifies authentication workflows. The Java-based

authentication system controls user access based on employee roles and skill classifications.

- **Unified Development Environment:** Using NetBeans for both presentation and business logic tiers creates consistency in the development process and simplifies integration between these layers.

By adopting this three-tier layered architecture with NetBeans, Java authentication, MySQL, and Windows Server, the ECS remains flexible enough to accommodate new features, reliable under increasing transaction loads, and secure in safeguarding sensitive data while enforcing the skill-based checkout requirements.

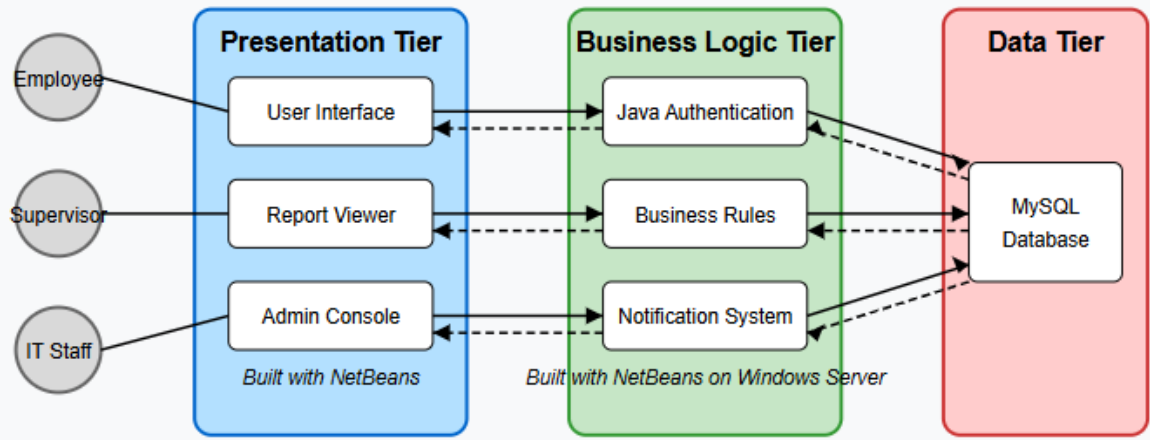
Three-Tier Architecture: Equipment Checkout System



Key Advantages

- Straightforward Scalability
- Clear Separation of Concerns
- Enhanced Security

Equipment Checkout System: Data Flow Architecture



Key System Functions

Presentation Tier

- User authentication interface
- Equipment checkout forms
 - Reporting dashboard
- Admin management console

Business Logic Tier

- Authentication services
- Skill-based access control
- Notification processing
- Report generation logic

Data Tier

- Employee records
- Equipment inventory
- Transaction history
- System logs and auditing