Linkella: Synthesis Paper

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**Introduction**

In the home healthcare industry, Certified Nursing Assistants (CNAs) face a variety of operational and logistical challenges. Inconsistent job schedules, financial tracking, and client communication all play moving parts in how CNAs manage their work. To address these issues, I developed Linkella, a web-based platform. Through a centralized marketplace and financial management system, there is now a way to bridge CNAs and clients. Built using Django and powered by a custom notification engine, review system, and forecasting tool, Linkella enables users to connect and manage care-related services. This system allows for greater transparency and efficiency.

This project serves as the capstone of the MSCISBA program and embodies the synthesis of four foundational curricular areas: Software Systems (SS), Business Analytics (BA), Data Management (DM), and Cybersecurity and Networking (CN). Each discipline is directly reflected in Linkella’s core functionality. Features such as role-based dashboards, automated job forecasting, secure data handling, and review analytics support this.

The purpose of this paper is to explain how the Linkella platform demonstrates a holistic understanding of the four integrated domains, and how the design and execution of this system reflects the full range of skills developed throughout the MSCISBA program.

**Software Systems**

Software Systems refer to the design, construction, and deployment of functional and scalable architectures. It includes everything from designing database schemas, routing login, to ensuring the system behaves predictably under different user roles and scenarios. Linkella demonstrates foundational and advanced knowledge of Software Systems as it was built using Django, a Python web framework that follows the Model-View-Template (MVT) architectural pattern. This allowed me to separate business logic from presentation and ensure maintainability throughout the application. The user authentication system was designed with Django’s built-in user model and extended using custom roles (is\_cna, is\_client). This supports role-based dashboards, which presents different features depending on whether a user is a CAN or a client. This implementation required control over routing and conditional rendering in templates, a clear example of applied software design principles. Another core Software Systems concept demonstrated is modular development. Each view function handles only the logic it needs, and data passed to templates is scoped to each user type.

Earlier in the MSCISBA program, I developed an API using FastAPI to create a Vital Sign Documentation System. That project introduced me to REST principles, model validation, and separation of layers using the repository pattern. Those same architectural desicsions reappear in Linkella, but on a larger scale with user interaction and front-end integration.

**Business Analytics**

Business Analytics is the practice of using data to uncover trends, evaluate performance, and guide how we make decisions. I define it as the stretch we make between raw information and meaningful action. It turn insight into something valuable. Within the MSCISBA curriculum, I developed proficiency in skills/tools like Tableau and Power BI, model evaluation, and forecasting methods. These skills taught me how to work with data, and how to interpret it to stakeholders in ways that support real decisions.

In Linkella, Business Analytics played a direct, practical role. On the CNA side of the platform, I developed a financial dashboard that allows users to log weekly job summaries, including client name, pay rate, and total hours. From this, the user would receive an automated 4-week forecast based on recent trends. This feature helps CNAs manage their time, estimate earnings, and gain instight into work volume over time. My previous work reinforced these concepts as well. In past courses, I developed dashboards iin Tableau and practiced visually summarizing complex data. I also applied logistic regression, neural neural networks, and NaÏve Bayes to real datasets, which allowed me to demonstrate how Business Analytics supports operational tools.

**Data Management**

Data Management ensures that information is collected, stored, and accessed securely and efficiently. I define it as the structural foundation behind any system that uses data to function. In this program, I have gained experience with SQL queries and concepts such as normalization, relationships, and handling data securely. All of these skills have informed the architecture of my capstone project.

In Linkella, I used Django’s ORM with SQLite to manage user data, CNA listings, job entries, and reviews. Each model was relationally structured, for example, CNA listings are linked to the users who created them, and reviews are tied to specific CNAs. This organization ensures that user roles, service records, and financial data are kept traceable and sclalable. The data integrity practices I have developed directly shape how I designed the backend of this application.

**Cybersecurity and Networking**

Cybersecurity and Networking are essential for protecting systems and ensuring reliable access to information. I define this area as the strategic use of tools to safeguard data, maintain integrity, and secure communication. In developing Linkella, I applied these principles by using Django’s authentication system which limited access to sensitive actions such as creating listings or submitting service requests. User data is tied to accounts and internal notifications are only accessible to their intended recipients.

Earlier work with tools like Wireshark and Nmap taught me how to recognize vulnerabilities and think critically about data flow. These concepts shaped the architecture of Linkella, particularly in ensuring form inputs, login processes, and database interactions that are protected against unauthorized access. While the application is deployed locally, it is structured to scale for broader use.

**Conclusion**

The Linkella platform is not just a reflection of the curriculum, but a tangible example of how these skills work together to solve industry-specific problems. Each curricular area informs the others, resulting in a cohesive solution that is both functional and meaningful.