

## SLIDE 1 - TITLE SLIDE

**Script (30 seconds):** "Good morning, everyone. My name is Joseph Klenk, and welcome to my CS 499 capstone code review presentation. Today I'll be demonstrating my comprehensive growth as a computer science professional through three enhanced artifacts that showcase mastery across all major domains of computer science."

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## SLIDE 2 - AGENDA

**Script (30 seconds):** "Here's our agenda for today. We'll examine three artifacts spanning Software Design and Engineering, Algorithms and Data Structures, and Databases. I'll show you the existing functionality, analyze areas for improvement, and demonstrate the enhancements I've implemented. We'll conclude with a walkthrough of my professional ePortfolio."

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## SLIDE 3 - THREE ARTIFACT CATEGORIES

**Script (30 seconds):** "These three artifacts represent the core areas of computer science. Each artifact has been significantly enhanced to demonstrate industry-standard best practices, security improvements, and performance optimizations. Let's dive into each one in detail."

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## ARTIFACT 1: SOFTWARE DESIGN & ENGINEERING (4 minutes)

### SLIDE 4 - ANDROID WEIGHT TRACKING APP OVERVIEW

**Script (45 seconds):** "Our first artifact is an Android Weight Tracking Application from CS 360. This mobile application provides a comprehensive personal health management solution. The app features user authentication, weight tracking with full CRUD operations, goal setting, and SMS notifications when users reach their target weight. It uses SQLite for local data storage and requires Android runtime permissions for SMS functionality."

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### SLIDE 5 - WEIGHT APP USER INTERFACE

**Script (30 seconds):** "The application begins with a secure login system and progresses to the main tracking interface where users can log their weight, view historical data, and monitor progress toward their goals."

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## **SLIDE 6 - ORIGINAL CODE - SECURITY VULNERABILITY**

**Script (45 seconds):** "Now let's examine the critical issues in the original code. The most serious problem is this security vulnerability - user passwords are stored in plaintext in the SQLite database. This is completely unacceptable for any health tracking application handling personal data. Any unauthorized access to the database would expose all user credentials."

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## **SLIDE 7 - ENHANCED CODE - SECURE PASSWORD HASHING**

**Script (45 seconds):** "Here's my enhanced solution. I've implemented secure password hashing using SHA-256 with salt. Each password is now properly hashed before storage, and I've added comprehensive error handling with try-catch blocks. This protects user data even if the database is compromised."

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## **SLIDE 8 - ORIGINAL CODE - MIXED RESPONSIBILITIES**

**Script (45 seconds):** "The original architecture violates separation of concerns. As you can see, the MainActivity contains UI logic, database operations, and business logic all mixed together. This makes the code difficult to maintain, test, and scale."

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## **SLIDE 9 - ENHANCED CODE - MVC ARCHITECTURE**

**Script (45 seconds):** "My enhanced version implements proper Model-View-Controller architecture. UI operations are clearly separated from business logic and database operations. I've added comprehensive error handling and input validation, making the code more maintainable and robust."

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## **SLIDE 10 - SOFTWARE ENGINEERING ENHANCEMENTS SUMMARY**

**Script (30 seconds):** "These enhancements demonstrate my ability to design secure, maintainable mobile applications using industry-standard architectural patterns while managing the trade-offs between security, performance, and usability."

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## **ARTIFACT 2: ALGORITHMS & DATA STRUCTURES (3 minutes)**

### **SLIDE 11 - PIRATE INTELLIGENT AGENT OVERVIEW**

**Script (45 seconds):** "Our second artifact is a Pirate Intelligent Agent from CS 370. This implements reinforcement learning for pathfinding in a treasure hunt game. The agent uses deep Q-learning with neural networks to predict optimal actions, employs epsilon-greedy exploration to balance exploitation and exploration, and uses experience replay to learn from past experiences."

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### **SLIDE 12 - ORIGINAL ALGORITHM - RANDOM SAMPLING**

**Script (45 seconds):** "The original implementation uses basic random sampling for experience replay. This approach treats all experiences equally, which is suboptimal because some experiences contain more valuable learning information than others. This leads to inefficient learning and slower convergence."

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### **SLIDE 13 - ENHANCED ALGORITHM - PRIORITY QUEUE**

**Script (45 seconds):** "My enhanced version implements priority-based experience replay using Python's heapq module. I calculate Temporal Difference errors to prioritize experiences with higher learning value. The system uses probability distributions for intelligent sampling, allowing the agent to learn from the most informative experiences first."

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## SLIDE 14 - PERFORMANCE IMPROVEMENTS

**Script (30 seconds):** "The results speak for themselves. My enhanced algorithm achieves 28.8% faster convergence, reducing training time from 10.36 to 7.2 minutes. This demonstrates measurable performance gains through advanced algorithms and data structures."

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## SLIDE 15 - ALGORITHMS ENHANCEMENTS SUMMARY

**Script (30 seconds):** "These enhancements demonstrate my mastery of advanced algorithms and data structures, showing how theoretical computer science concepts translate into measurable performance improvements in real applications."

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## ARTIFACT 3: DATABASES (3 minutes)

### SLIDE 16 - ANIMAL SHELTER DASHBOARD OVERVIEW

**Script (45 seconds):** "Our third artifact is the Animal Shelter Dashboard from CS 340. This Python/Dash web application interfaces with MongoDB to help rescue organizations identify dogs suitable for specialized training programs. It features interactive data filtering, real-time table updates, and geolocation visualization."

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### SLIDE 17 - ORIGINAL DATABASE CODE - BASIC QUERIES

**Script (45 seconds):** "The original implementation uses basic MongoDB find() queries without leveraging advanced database capabilities. It retrieves entire documents when only specific fields are needed, wastes bandwidth, and performs most data processing in the application layer rather than at the database level."

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### SLIDE 18 - ENHANCED DATABASE CODE - OPTIMIZED OPERATIONS

**Script (45 seconds):** "My enhanced version implements field projection to retrieve only necessary data, comprehensive error handling for database operations, and performance optimization by limiting large dataset displays. I've also centralized all database operations in a dedicated module for better maintainability."

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## **SLIDE 19 - ENHANCED UI - REAL-TIME UPDATES**

**Script (30 seconds):** "The enhanced UI provides real-time result summaries, performance indicators, and intelligent data limiting. Users can see exactly how many animals match their filters, and the system handles large datasets efficiently."

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## **SLIDE 20 - DATABASE ENHANCEMENTS SUMMARY**

**Script (30 seconds):** "These enhancements demonstrate my ability to design efficient database solutions that deliver significant value to end users while maintaining optimal performance with large datasets."

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# **COURSE OUTCOMES & EPORTFOLIO (3 minutes)**

## **SLIDE 21 - COURSE OUTCOMES ALIGNMENT**

**Script (45 seconds):** "These enhancements align perfectly with our five program outcomes. My code review process enables collaboration, this presentation demonstrates professional communication, each artifact shows computing problem-solving, all enhancements implement innovative techniques, and the security improvements in the Android app demonstrate a proactive security mindset."

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## **SLIDE 22 - EPORTFOLIO HOMEPAGE**

**Script (30 seconds):** "Now let me walk you through my professional ePortfolio website, which showcases all these enhancements in a polished, professional format. The portfolio is designed with clear navigation and professional presentation standards."

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## **SLIDE 23 - PROFESSIONAL SELF-ASSESSMENT**

**Script (30 seconds):** "The portfolio begins with my professional self-assessment, providing context for my growth throughout the program and explaining how these artifacts demonstrate my readiness for professional software development roles."

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## **SLIDE 24 - ARTIFACT SECTIONS WALKTHROUGH**

**Script (45 seconds):** "Each artifact has its own dedicated section with comprehensive enhancement descriptions, specific skills demonstrated, and clear alignments to course outcomes. Notice how I've included links to both original and enhanced code repositories, making it easy for viewers to see the complete transformation. The algorithms section prominently features the 28.8% performance improvement, providing concrete evidence of my technical capabilities."

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## **SLIDE 25 - TECHNICAL SKILLS SHOWCASE**

**Script (30 seconds):** "The portfolio concludes with a comprehensive overview of technical skills gained throughout the program and professional contact information, creating a complete professional package for potential employers."

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## **CONCLUSION (1 minute)**

## **SLIDE 26 - KEY ACHIEVEMENTS SUMMARY**

**Script (30 seconds):** "In summary, these three artifacts demonstrate my comprehensive growth as a computer science professional. The Android application shows secure, maintainable mobile development. The intelligent agent demonstrates advanced algorithms with measurable performance gains. The database dashboard showcases full-stack development and optimization skills."

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## **SLIDE 27 - PROFESSIONAL READINESS**

**Script (30 seconds):** "Together, these enhancements provide concrete evidence of my readiness to contribute to professional software development teams and tackle complex technical challenges. Each enhancement demonstrates not just coding ability, but the kind of thoughtful, security-conscious, performance-oriented development that employers value most."

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## **SLIDE 28 - THANK YOU & CONTACT**

**Script (30 seconds):** "Thank you for your time and attention during this code review presentation. I'm proud of the growth these artifacts represent and excited about applying these skills in my professional career. I'm happy to answer any questions you may have about my code review, enhancement implementations, or future development plans. You can find all of this work and more in my ePortfolio, and I welcome any feedback or opportunities to discuss these projects further."