**Architectural Design Document (ADD)**

**Personal Portfolio Website**

**Document Information**

* **Project Name:** Personal Portfolio Website
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* **Institution:** The Co-operative University of Kenya
* **Program:** Information Technology
* **Document Version:** 1.0
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* **Document Status:** Design Phase

**1. Introduction**

**1.1 Purpose**

This Architectural Design Document defines the technical architecture, system structure, and design specifications for the Personal Portfolio Website as outlined in the Software Requirements Specification (SRS) v1.0.

**1.2 Scope**

This document covers the complete architectural design including:

* System architecture and components
* User interface design specifications
* Data flow and interaction patterns
* Technology stack implementation
* File organization and structure
* Design patterns and methodologies

**1.3 Architecture Overview**

The portfolio website follows a **Static Single Page Application (SPA)** architecture using pure HTML5 and CSS3, implementing a mobile-first responsive design pattern with semantic markup and modern CSS layout techniques.

**2. System Architecture**

**2.1 High-Level Architecture**

**2.1.1 Architecture Pattern**

**Pattern:** Layered Architecture with Separation of Concerns

* **Presentation Layer:** HTML5 semantic structure
* **Style Layer:** CSS3 modular stylesheets
* **Asset Layer:** Optimized images and media files

**2.1.2 System Components**

┌─────────────────────────────────────────┐

│ Browser Environment │

├─────────────────────────────────────────┤

│ Presentation Layer │

│ ┌─────────┬─────────┬─────────────────┐│

│ │ Header │ Main │ Footer ││

│ │ Section │ Content │ Section ││

│ └─────────┴─────────┴─────────────────┘│

├─────────────────────────────────────────┤

│ Style Layer │

│ ┌─────────┬─────────┬─────────────────┐│

│ │ Base │ Layout │ Component ││

│ │ Styles │ Styles │ Styles ││

│ └─────────┴─────────┴─────────────────┘│

├─────────────────────────────────────────┤

│ Asset Layer │

│ ┌─────────┬─────────┬─────────────────┐│

│ │ Images │ Fonts │ Icons ││

│ └─────────┴─────────┴─────────────────┘│

└─────────────────────────────────────────┘

**2.2 Component Architecture**

**2.2.1 HTML Structure Components**

1. **Document Head**
   * Meta tags for SEO and viewport
   * External resource links
   * Semantic markup declarations
2. **Navigation Component**
   * Fixed/sticky header navigation
   * Mobile hamburger menu structure
   * Smooth scroll anchor links
3. **Content Sections**
   * Hero/Landing section
   * About section
   * Education section
   * Skills section
   * Projects section
   * Contact section
4. **Footer Component**
   * Copyright information
   * Additional contact links
   * Social media integration

**2.2.2 CSS Architecture Components**

1. **Base Layer**
   * CSS Reset/Normalize
   * Typography definitions
   * Color variables and themes
2. **Layout Layer**
   * Grid systems
   * Flexbox containers
   * Responsive breakpoints
3. **Component Layer**
   * Navigation styles
   * Card components
   * Button styles
   * Form elements
4. **Utility Layer**
   * Helper classes
   * Spacing utilities
   * Display utilities

**3. Technical Design Specifications**

**3.1 Responsive Design Architecture**

**3.1.1 Breakpoint Strategy**

/\* Mobile First Approach \*/

/\* Base styles: 320px - 767px (Mobile) \*/

/\* Tablet: 768px - 1023px \*/

/\* Desktop: 1024px - 1440px \*/

/\* Large Desktop: 1441px+ \*/

**3.1.2 Layout Systems**

* **Primary:** CSS Grid for main page layout
* **Secondary:** Flexbox for component-level layouts
* **Tertiary:** Float fallbacks for older browser support

**3.2 CSS Methodology**

**3.2.1 Naming Convention**

**BEM (Block Element Modifier) Methodology**

/\* Block \*/

.navigation { }

/\* Element \*/

.navigation\_\_item { }

.navigation\_\_link { }

/\* Modifier \*/

.navigation\_\_link--active { }

.navigation\_\_item--mobile { }

**3.2.2 File Organization Strategy**

css/

├── base/

│ ├── reset.css

│ ├── typography.css

│ └── variables.css

├── layout/

│ ├── grid.css

│ ├── header.css

│ └── footer.css

├── components/

│ ├── navigation.css

│ ├── cards.css

│ ├── buttons.css

│ └── forms.css

├── pages/

│ └── home.css

└── utilities/

├── spacing.css

└── display.css

**3.3 Performance Optimization Strategy**

**3.3.1 CSS Optimization**

* Minification of CSS files
* Critical CSS inlining for above-the-fold content
* Non-critical CSS lazy loading
* CSS property optimization and grouping

**3.3.2 Image Optimization**

* WebP format with JPEG fallbacks
* Responsive images with srcset
* Lazy loading implementation via CSS
* Optimized file sizes (max 100KB per image)

**4. User Interface Design Architecture**

**4.1 Design System Specifications**

**4.1.1 Color Palette**

:root {

/\* Primary Colors \*/

--primary-dark: #1a1a1a;

--primary-light: #ffffff;

--accent-blue: #007acc;

--accent-green: #28a745;

/\* Neutral Colors \*/

--gray-100: #f8f9fa;

--gray-200: #e9ecef;

--gray-300: #dee2e6;

--gray-800: #343a40;

--gray-900: #212529;

/\* Status Colors \*/

--success: #28a745;

--warning: #ffc107;

--error: #dc3545;

--info: #17a2b8;

}

**4.1.2 Typography System**

:root {

/\* Font Families \*/

--font-primary: 'Inter', 'Segoe UI', sans-serif;

--font-heading: 'Poppins', 'Helvetica Neue', sans-serif;

--font-mono: 'JetBrains Mono', 'Courier New', monospace;

/\* Font Sizes \*/

--text-xs: 0.75rem; /\* 12px \*/

--text-sm: 0.875rem; /\* 14px \*/

--text-base: 1rem; /\* 16px \*/

--text-lg: 1.125rem; /\* 18px \*/

--text-xl: 1.25rem; /\* 20px \*/

--text-2xl: 1.5rem; /\* 24px \*/

--text-3xl: 1.875rem; /\* 30px \*/

--text-4xl: 2.25rem; /\* 36px \*/

--text-5xl: 3rem; /\* 48px \*/

}

**4.1.3 Spacing System**

:root {

/\* Spacing Scale \*/

--space-1: 0.25rem; /\* 4px \*/

--space-2: 0.5rem; /\* 8px \*/

--space-3: 0.75rem; /\* 12px \*/

--space-4: 1rem; /\* 16px \*/

--space-5: 1.25rem; /\* 20px \*/

--space-6: 1.5rem; /\* 24px \*/

--space-8: 2rem; /\* 32px \*/

--space-10: 2.5rem; /\* 40px \*/

--space-12: 3rem; /\* 48px \*/

--space-16: 4rem; /\* 64px \*/

--space-20: 5rem; /\* 80px \*/

}

**4.2 Component Design Specifications**

**4.2.1 Navigation Component**

.navigation {

position: fixed;

top: 0;

width: 100%;

background: rgba(255, 255, 255, 0.95);

backdrop-filter: blur(10px);

z-index: 1000;

padding: var(--space-4) 0;

transition: all 0.3s ease;

}

.navigation\_\_container {

max-width: 1200px;

margin: 0 auto;

display: flex;

justify-content: space-between;

align-items: center;

padding: 0 var(--space-4);

}

**4.2.2 Card Component**

.card {

background: var(--primary-light);

border-radius: 12px;

box-shadow: 0 4px 6px rgba(0, 0, 0, 0.1);

padding: var(--space-6);

transition: transform 0.3s ease, box-shadow 0.3s ease;

}

.card:hover {

transform: translateY(-4px);

box-shadow: 0 8px 25px rgba(0, 0, 0, 0.15);

}

**4.2.3 Button Component**

.button {

display: inline-flex;

align-items: center;

justify-content: center;

padding: var(--space-3) var(--space-6);

border: none;

border-radius: 6px;

font-weight: 500;

text-decoration: none;

transition: all 0.2s ease;

cursor: pointer;

}

.button--primary {

background: var(--accent-blue);

color: var(--primary-light);

}

.button--secondary {

background: transparent;

color: var(--accent-blue);

border: 2px solid var(--accent-blue);

}

**5. Data Flow and Interaction Design**

**5.1 User Interaction Flow**

**5.1.1 Navigation Flow**

User Lands on Site →

Hero Section Loads →

Navigation Menu Available →

User Clicks Section Link →

Smooth Scroll to Section →

Section Content Displays →

Navigation Updates Active State

**5.1.2 Responsive Interaction Flow**

Page Load →

Screen Size Detection →

Appropriate Layout Applied →

Touch/Mouse Events Enabled →

Responsive Navigation Activated →

Content Reflows Dynamically

**5.2 Content Loading Strategy**

**5.2.1 Progressive Enhancement**

1. **Base Layer:** Core HTML content loads first
2. **Enhancement Layer:** CSS styling applies progressively
3. **Optimization Layer:** Advanced features for modern browsers

**5.2.2 Critical Rendering Path**

HTML Parse →

CSS Parse →

Render Tree Construction →

Layout Calculation →

Paint →

Composite

**6. File Structure and Organization**

**6.1 Project Directory Structure**

portfolio-website/

├── index.html

├── css/

│ ├── main.css

│ ├── base/

│ │ ├── reset.css

│ │ ├── typography.css

│ │ └── variables.css

│ ├── layout/

│ │ ├── grid.css

│ │ ├── header.css

│ │ └── sections.css

│ ├── components/

│ │ ├── navigation.css

│ │ ├── cards.css

│ │ ├── buttons.css

│ │ └── forms.css

│ └── utilities/

│ ├── spacing.css

│ └── helpers.css

├── images/

│ ├── profile/

│ ├── projects/

│ └── icons/

├── fonts/

└── docs/

├── srs.md

└── add.md

**6.2 HTML Document Structure**

<!DOCTYPE html>

<html lang="en">

<head>

<!-- Meta and Links -->

</head>

<body>

<header class="navigation">

<!-- Navigation Component -->

</header>

<main class="main-content">

<section id="hero" class="hero-section">

<!-- Hero Content -->

</section>

<section id="about" class="about-section">

<!-- About Content -->

</section>

<section id="education" class="education-section">

<!-- Education Content -->

</section>

<section id="skills" class="skills-section">

<!-- Skills Content -->

</section>

<section id="projects" class="projects-section">

<!-- Projects Content -->

</section>

<section id="contact" class="contact-section">

<!-- Contact Content -->

</section>

</main>

<footer class="footer">

<!-- Footer Content -->

</footer>

</body>

</html>

**7. Security and Accessibility Design**

**7.1 Security Considerations**

* Input sanitization for contact forms
* External link security (rel="noopener noreferrer")
* Content Security Policy headers
* No sensitive data exposure in source code

**7.2 Accessibility Design**

* Semantic HTML5 elements
* ARIA labels and roles
* Keyboard navigation support
* Color contrast compliance (WCAG 2.1 AA)
* Alt text for all images
* Focus management and visual indicators

**8. Performance Design Considerations**

**8.1 Loading Performance**

* Critical CSS inlining
* Image optimization and lazy loading
* Minified CSS and HTML
* Efficient CSS selectors

**8.2 Runtime Performance**

* Hardware-accelerated CSS animations
* Efficient layout calculations
* Minimal DOM manipulations
* Optimized CSS painting

**9. Browser Compatibility Strategy**

**9.1 Progressive Enhancement Approach**

1. **Base Experience:** Core functionality in all browsers
2. **Enhanced Experience:** Modern features for capable browsers
3. **Fallback Strategy:** Graceful degradation for older browsers

**9.2 Compatibility Matrix**

| **Feature** | **Chrome 90+** | **Firefox 88+** | **Safari 14+** | **Edge 90+** |
| --- | --- | --- | --- | --- |
| CSS Grid | ✅ | ✅ | ✅ | ✅ |
| Flexbox | ✅ | ✅ | ✅ | ✅ |
| Custom Properties | ✅ | ✅ | ✅ | ✅ |
| Backdrop Filter | ✅ | ⚠️ | ✅ | ✅ |

**10. Testing Strategy**

**10.1 Cross-Browser Testing**

* Chrome, Firefox, Safari, Edge testing
* Mobile browser testing (iOS Safari, Chrome Mobile)
* Responsive design testing across breakpoints

**10.2 Accessibility Testing**

* Screen reader compatibility
* Keyboard navigation testing
* Color contrast validation
* WAVE accessibility evaluation

**10.3 Performance Testing**

* PageSpeed Insights analysis
* Lighthouse audit scores
* Cross-device performance validation

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