

# Technical Specification

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**Date:** November 2025

**Version:** 1.0

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# Advanced Markdown Showcase

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**A comprehensive demonstration of markdown capabilities**

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## Introduction

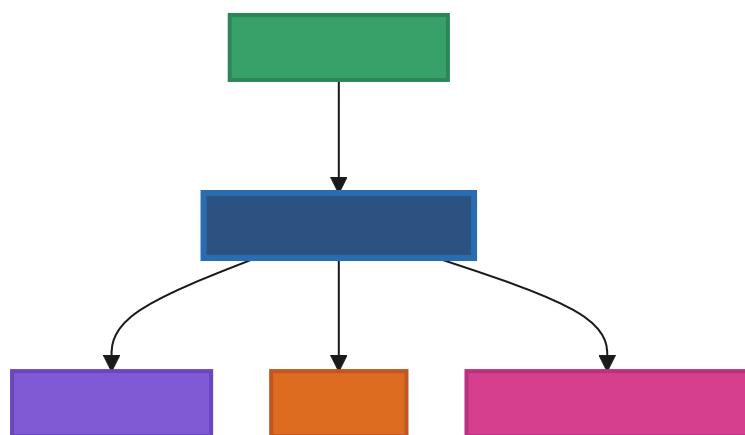
This document showcases the full range of markdown features supported by the docs-pipeline system, including advanced diagrams, tables, code blocks, and typographic elements. Each section demonstrates a different capability that renders beautifully across all four visual profiles.

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## Architecture Diagrams

### System Context Diagram

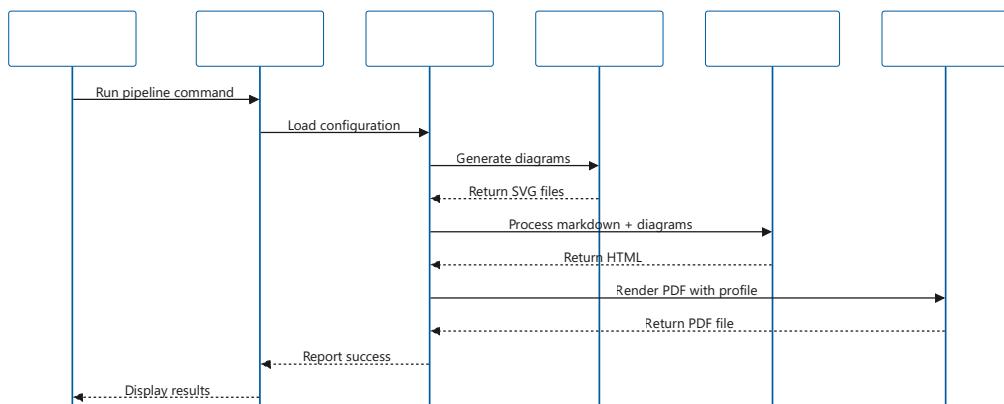
The following C4 context diagram shows the high-level system architecture:



*Diagram*

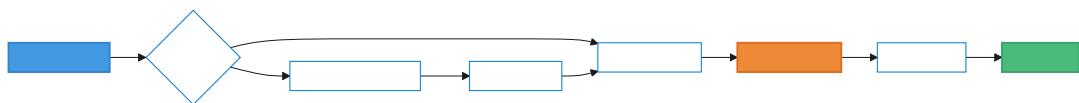
## Sequence Diagram

Here's how the PDF generation process flows:



*Diagram*

## Data Flow Diagram



*Diagram*

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# Complex Tables

## Feature Comparison Matrix

Feature	Tech Whitepaper	Dark Pro	Minimalist	Enterprise Blue
Background	White	Dark Navy	Off-White	White
Primary Color	Blue (#1976d2)	Cyan (#93c5fd)	Gray (#2c3e50)	Corporate Blue (#003d7a)
Typography	Serif + Sans	Modern Sans	Ultra-light	Corporate Sans
Code Blocks	Light gray bg	Dark bg + border	Minimal bg	Blue-tinted bg
Tables	Standard borders	Subtle borders	Borderless	Strong borders
Use Case	Print docs	Screen viewing	Architecture docs	Business reports
Page Margins	Standard	Compact	Generous	Standard
Heading Style	Bold + underline	Uppercase + glow	Thin + minimal	Corporate gradient

## Performance Benchmarks

Document Size	Processing Time	Memory Usage	Output Size
Small (1-5 pages)	1.2s	45 MB	250 KB
Medium (10-20 pages)	3.5s	78 MB	890 KB
Large (50-100 pages)	12.8s	156 MB	3.2 MB
Enterprise (200+ pages)	45.2s	312 MB	8.7 MB

## Technology Stack

Component	Technology	Version	Purpose
<b>Parser</b>	Pandoc	3.1+	Markdown → HTML conversion
<b>Diagrams</b>	Mermaid CLI	10.6+	Diagram rendering
<b>Architecture</b>	Structurizr CLI	Latest	C4 model diagrams
<b>PDF Renderer</b>	WeasyPrint	60.0+	HTML → PDF (default)
<b>PDF Renderer (Alt)</b>	Playwright	1.40+	HTML → PDF (enhanced SVG)
<b>Orchestration</b>	Python	3.10+	Pipeline coordination

## **Code Examples**

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### **Python API Implementation**

```
from pathlib import Path
from typing import Optional
import asyncio

class DocumentPipeline:
    """
    Production-grade document generation pipeline.

    Coordinates diagram generation, markdown processing,
    and PDF rendering with configurable profiles.
    """

    def __init__(self, config_path: Path, profile: str = "tech-
whitepaper"):
        self.config = self._load_config(config_path)
        self.profile = profile
        self.cache_enabled = True

    @async def process(self, input_file: Path, output_file: Path)
        -> bool:
        """
        Process a single document through the pipeline.

        Args:
            input_file: Source markdown file
            output_file: Target PDF file path

        Returns:
            True if successful, False otherwise
        """

    try:
        # Step 1: Generate diagrams
        diagrams = await self._render_diagrams(input_file)

        # Step 2: Process markdown with diagrams
    
```

```
        html = await self._markdown_to_html(input_file,
diagrams)

    # Step 3: Render PDF with selected profile
    success = await self._render_pdf(html, output_file,
self.profile)

    return success

except Exception as e:
    self._log_error(f"Pipeline failed: {e}")
    return False

def _load_config(self, path: Path) -> dict:
    """Load and validate YAML configuration."""
    import yaml
    with open(path) as f:
        return yaml.safe_load(f)
```

## JavaScript Event Handler

```
// Real-time document preview system

class DocumentPreview {

    constructor(container, apiEndpoint) {
        this.container = container;
        this.api = apiEndpoint;
        this.debounceTimer = null;
        this.currentRequest = null;
    }

    async updatePreview(markdown) {
        // Debounce rapid changes
        clearTimeout(this.debounceTimer);

        this.debounceTimer = setTimeout(async () => {
            try {
                // Cancel previous request if still pending
                if (this.currentRequest) {
                    this.currentRequest.abort();
                }

                // Create new request with AbortController
                const controller = new AbortController();
                this.currentRequest = controller;

                const response = await fetch(this.api, {
                    method: 'POST',
                    headers: { 'Content-Type': 'application/json' },
                    body: JSON.stringify({
                        markdown,
                        profile: 'tech-whitepaper'
                    }),
                    signal: controller.signal
                });
            }
        }, 100);
    }
}
```

```
    if (response.ok) {
      const { html } = await response.json();
      this.container.innerHTML = html;
      this._attachEventListeners();
    }
  } catch (err) {
    if (err.name !== 'AbortError') {
      console.error('Preview update failed:', err);
    }
  }
}, 300);
}

_attachEventListeners() {
  // Handle internal navigation
  const links = this.container.querySelectorAll('a[href^="#"]');
  links.forEach(link => {
    link.addEventListener('click', e => {
      e.preventDefault();
      const target = document.querySelector(link.hash);
      target?.scrollIntoView({ behavior: 'smooth' });
    });
  });
}
}
```

## YAML Configuration

```
# docs-pipeline.yaml - Production configuration

workspaces:
  production:
    # Structurizr diagram generation
    diagrams:
      workspace: architecture/system.dsl
      workspace_dir: architecture/
      formats: ["svg", "png", "mermaid"]
      output_dir: docs/diagrams/
    resources:
      - architecture/styles/
      - architecture/icons/

# Document generation with multiple profiles

documents:
  # Technical specification - all profiles
  - input: docs/specs/system-architecture.md
    output: output/specs/architecture-tech.pdf
    format: pdf
    profile: tech-whitepaper
    renderer: playwright

  - input: docs/specs/system-architecture.md
    output: output/specs/architecture-dark.pdf
    format: pdf
    profile: dark-pro
    renderer: playwright

  # API reference - enterprise profile
  - input: docs/api/reference.md
    output: output/api/reference.pdf
    format: pdf
```

`profile: enterprise-blue`

`renderer: weasyprint`

## Bash Deployment Script

This document contains the Bash deployment script used for deploying applications to a server.

The script is located at `/path/to/deployment_script.sh`.

The script performs the following steps:

- Step 1: Stop the application service.

- Step 2: Copy the new application code to the deployment directory.

- Step 3: Update the application configuration files.

- Step 4: Start the application service.

If any step fails, the script exits with an error code.

The script is run by a cron job every hour.

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```
#!/bin/bash

set -euo pipefail


# docs-pipeline deployment script
REPO_ROOT=$(cd "$(dirname "${BASH_SOURCE[0]}")/.." && pwd)"
OUTPUT_DIR="${REPO_ROOT}/output"
DOCS_DIR="${REPO_ROOT}/docs"

echo "🚀 Starting document pipeline..."


# Step 1: Clean previous output
if [[ -d "$OUTPUT_DIR" ]]; then
    echo "⚡ Cleaning output directory..."
    rm -rf "$OUTPUT_DIR"/*
fi


# Step 2: Generate architecture diagrams
echo "🏗 Generating Structurizr diagrams..."
python -m tools.structurizr.cli \
    --workspace architecture/system.dsl \
    --format svg,png,mermaid \
    --output "$DOCS_DIR/diagrams/"


# Step 3: Process all documents
echo "📄 Processing markdown documents..."
python -m tools.docs_pipeline.cli \
    --config docs-pipeline.yaml \
    --parallel \
    --verbose


# Step 4: Verify outputs
echo "☑ Verifying generated files..."
required_files=(
    "output/specs/architecture-tech.pdf"
```

```

    "output/specs/architecture-dark.pdf"
    "output/api/reference.pdf"
)

for file in "${required_files[@]}"; do
    if [[ ! -f "$REPO_ROOT/$file" ]]; then
        echo "✗ Missing required file: $file"
        exit 1
    fi
done

echo "◆ Pipeline complete! Generated $(find "$OUTPUT_DIR" -name
'*pdf' | wc -l) documents."

```

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## Mathematical Expressions

### Inline Math

The quadratic formula is 
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$
 and the exponential function is 
$$e^{i\pi} + 1 = 0$$
.

### Display Math

$$\begin{aligned} \nabla \times \vec{E} &= -\frac{\partial \vec{B}}{\partial t} \\ \nabla \times \vec{B} &= \mu_0 \vec{J} + \mu_0 \epsilon_0 \frac{\partial \vec{E}}{\partial t} \\ \nabla \cdot \vec{E} &= \frac{\rho}{\epsilon_0} \\ \nabla \cdot \vec{B} &= 0 \end{aligned}$$

Performance scaling follows:

$$T(n) = O(n \log n)$$
 where  $n = \text{document size}$

# Lists and Hierarchies

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## Feature Roadmap

- 1. Phase 1: Core Pipeline (Q4 2024)**
  - Markdown to PDF conversion
  - Basic Mermaid diagram support
  - Single profile system
  - CLI interface
- 2. Phase 2: Multi-Profile System (Q1 2025)**
  - Four distinct visual profiles
  - Profile-specific CSS
  - Configurable renderer selection
  - Web demo interface
- 3. Phase 3: Advanced Features (Q2 2025)**
  - Structurizr C4 integration
  - Multi-workspace orchestration
  - Parallel document processing
  - Diagram caching system
- 4. Phase 4: Enterprise Features (Q3 2025)**
  - Custom branding support
  - Template library
  - API access
  - Cloud deployment options

## Technical Requirements

- **System Requirements**
  - Python 3.10 or higher
  - Node.js 18+ (for Mermaid CLI)

- Docker (optional, for Structurizr)
- 2GB RAM minimum (4GB recommended)

- **Development Tools**

- Git for version control
- VS Code or similar editor
- pytest for testing
- ruff for linting

- **Optional Dependencies**

- Playwright (for enhanced PDF rendering)
  - SVGO (for SVG optimization)
  - KaTeX CLI (for math rendering)
  - PlantUML (for UML diagrams)
- 

## Callouts and Quotes

### ***Important Note***

*This document demonstrates production-ready markdown processing capabilities. All features shown here are fully functional and render consistently across all four visual profiles.*

### ***Performance Tip***

*Enable diagram caching with `use_cache: true` in your configuration to significantly reduce processing time for repeated builds. Cached diagrams are stored in `tools/pdf/output/pdf-diagrams/` by default.*

# Special Elements

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## Horizontal Rules

Sections can be separated with horizontal rules for visual clarity:

---

## Inline Formatting

Text can be **bold**, *italic*, **bold and italic**, ~~strikethrough~~, `inline code`, or even superscript and subscript:

## Links and References

For more information, see: - Pandoc Documentation - Mermaid Syntax - Structurizr DSL - WeasyPrint Documentation

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## Conclusion

This showcase demonstrates the comprehensive markdown capabilities of the docs-pipeline system. From simple formatting to complex diagrams, tables, and code blocks, every element renders beautifully across all visual profiles.

## Key Takeaways

- ✓ **Multi-format support** - PDF, DOCX, and HTML outputs
  - ✓ **Four visual profiles** - Choose the right look for your audience
  - ✓ **Production-ready** - Handles enterprise-scale documentation
  - ✓ **Extensible** - Add custom profiles and renderers
  - ✓ **Fast** - Parallel processing and intelligent caching
-