

Code Repository Documentation

Repository: src

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```

#!/usr/bin/env node

import { Command } from 'commander';
import path from 'path';
import fs from 'fs-extra';
import { run } from './main';
import { logger } from './utils/logger';
import { PdfOptions } from './utils/types';
import { themes } from './utils/themes';

const program = new Command();

// Get version from package.json
const packageJsonPath = path.join(__dirname, '..', 'package.json'); // Adjust path if needed
const packageJson = fs.readJsonSync(packageJsonPath);

program
  .name('xprinto')
  .description('Convert code repositories to beautiful PDFs with syntax highlighting.')
  .version(packageJson.version)
  .argument('<repository-path>', 'Path to the code repository or directory')
  .option('-o, --output <path>', 'Output path for the generated PDF file', 'code-output.pdf')
  .option('-t, --title <title>', 'Title for the PDF document', 'Code Repository Documentation')
  .option('-f, --font-size <size>', 'Font size for code blocks', '9') // Adjusted default
  .option('--theme <name>', `Syntax highlighting theme (available: ${Object.keys(themes).join(', ')}`)
  .option('--highlight -line-numbers', 'Show line numbers in code blocks (default)')
  .option('--no-line-numbers', 'Hide line numbers in code blocks')
  .option('--paper-size <size>', 'Paper size (A4, Letter, or width,height in points)', 'A4')
  .option('-v, --verbose', 'Enable verbose logging output', false)
  .action(async (repoPathArg, options) => {
    logger.setVerbose(options.verbose);
    // Set env var for verbose stack traces in main
    if (options.verbose) {
      process.env.XP_VERBOSE = 'true';
    }

    const resolvedRepoPath = path.resolve(repoPathArg);
    const resolvedOutputPath = path.resolve(options.output);

    logger.info(`Input path resolved to: ${resolvedRepoPath}`);
    logger.info(`Output path resolved to: ${resolvedOutputPath}`);

    // Validate input path exists and is a directory
    try {
      const stats = await fs.stat(resolvedRepoPath);
      if (!stats.isDirectory()) {
        logger.error(`Input path must be a directory: ${resolvedRepoPath}`);
        process.exit(1);
      }
    } catch (error) {
      logger.error(`Cannot access input path: ${resolvedRepoPath}`);
      logger.error((error as Error).message);
      process.exit(1);
    }

    // Validate theme
    if (!themes[options.theme.toLowerCase()]) {
      logger.error(`Invalid theme specified: ${options.theme}. Available: ${Object
    .keys(themes)
    .join(', ')}`);
      process.exit(1);
    }
  });

```

```

// Parse paper size
let paperSizeOption: PdfOptions['paperSize'];
if (options.paperSize.includes(',')) {
    const dims = options.paperSize.split(',').map(Number);
    if (dims.length === 2 && !isNaN(dims[0]) && !isNaN(dims[1]) && dims[0] > 0 && dims[1] > 0
) {
        paperSizeOption = [dims[0], dims[1]];
    } else {
        logger.error(
'Invalid paper size format. Use "width,height" in points (e.g., "595,842").');
    }
} else if (options.paperSize.toUpperCase() === 'A4' || options.paperSize.toUpperCase() ===
'LETTER') {
    paperSizeOption = options.paperSize.toUpperCase() as 'A4' | 'Letter';
} else {
    logger.error('Invalid paper size. Use "A4", "Letter", or "width,height".');
    process.exit(1);
}

// Construct PDF options object
const pdfOptions: PdfOptions = {
    output: resolvedOutputPath,
    title: options.title,
    fontSize: parseInt(options.fontSize, 10),
    showLineNumbers: options.lineNumbers, // Commander handles --no- prefix automatically
    theme: options.theme.toLowerCase(),
    paperSize: paperSizeOption,
    // --- Sensible Defaults for Layout ---
    // Adjust these margins and heights as needed for aesthetics
    margins: { top: 50, right: 40, bottom: 50, left: 40 },
    headerHeight: 25, // Space for file path header
    footerHeight: 25, // Space for page number footer
    tocTitle: "Table of Contents",
    codeFont: 'Courier', // Standard monospace PDF font
    textFont: 'Helvetica' // Standard sans-serif PDF font
};

// Validate font size
if (isNaN(pdfOptions.fontSize) || pdfOptions.fontSize <= 0) {
    logger.error(`Invalid font size: ${options.fontSize}. Must be a positive number.`);
    process.exit(1);
}

// Run the main logic
await run(resolvedRepoPath, pdfOptions);
});

// Make sure to parse arguments
program.parse(process.argv);

```

```

import path from 'path';
import fs from 'fs-extra'; // Using fs-extra for convenience like pathExists
import { glob } from 'glob';
import ignore, { Ignore } from 'ignore';
import { logger } from './utils/logger';
import { FileInfo } from './utils/types';

// List of common binary file extensions (can be expanded)
const BINARY_EXTENSIONS = new Set([
  'png', 'jpg', 'jpeg', 'gif', 'bmp', 'tiff', 'webp',
  'mp3', 'wav', 'ogg', 'flac',
  'mp4', 'avi', 'mov', 'wmv', 'mkv',
  'pdf', 'doc', 'docx', 'xls', 'xlsx', 'ppt', 'pptx',
  'zip', 'rar', 'gz', 'tar', '7z',
  'exe', 'dll', 'so', 'dylib', 'app',
  'o', 'a', 'obj',
  'jar', 'class',
  'pyc',
  'lock', // Lock files
  'log', // Log files often not needed
  'svg', // Sometimes treated as code, sometimes as binary asset
  // Add more as needed
]);

// Files to always ignore regardless of .gitignore
const ALWAYS_IGNORE = [
  '**/node_modules/**',
  '**/.git/**',
  '**/.svn/**',
  '**/.hg/**',
  '**/.vscode/**',
  '**/.idea/**',
  '**/dist/**', // Common build output directory
  '**/build/**', // Common build output directory
  '**/coverage/**', // Coverage reports
];

/**
 * Finds relevant code files in a directory, respecting .gitignore.
 * @param repoPath The absolute path to the repository root.
 * @returns A promise resolving to an array of FileInfo objects.
 */
export async function findCodeFiles(repoPath: string): Promise<FileInfo[]> {
  logger.info(`Scanning directory: ${repoPath}`);

  // 1. Initialize ignore instance and add always-ignored patterns
  const ig = ignore().add(ALWAYS_IGNORE);

  // 2. Find and load .gitignore files
  const gitignoreFiles = await glob('**/.gitignore', {
    cwd: repoPath,
    absolute: true,
    dot: true, // Include dotfiles like .gitignore
    ignore: ['**/node_modules/**', '**/.git/**'], // Avoid searching in these
  });

  for (const gitignorePath of gitignoreFiles) {
    try {
      if (await fs.pathExists(gitignorePath)) {
        const content = await fs.readFile(gitignorePath, 'utf-8');

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const relativeDir = path.dirname(path.relative(repoPath, gitignorePath));
// Add patterns relative to the .gitignore file's location
ig.add(content.split(/\r?\n/).map(line => {
  // Handle patterns relative to the .gitignore location
  if (line.trim() && !line.startsWith('#')) {
    // If pattern doesn't start with '/', make it relative to the dir
    if (!line.startsWith('/') && relativeDir !== '.') {
      // If the pattern starts with a dot, it's a negated pattern, handle it separately
      return path.join(relativeDir, line).replace(/\\/g, '/');
    } else {
      // For negated patterns, keep them relative but adjust path
      return '.' + path.join(relativeDir, line.substring(1)).replace(/\\/g, '/');
    }
  }
  return line;
})).filter(Boolean)); // Filter out empty strings
logger.debug(`Loaded .gitignore: ${gitignorePath}`);
} catch (error) {
  logger.warn(`Failed to read or parse .gitignore file ${gitignorePath}: ${(error as Error).message}`);
}

// 3. Find all files using glob initially (excluding directories)
const allFiles = await glob('**/*', {
  cwd: repoPath,
  absolute: true,
  nodir: true, // Only files, not directories
  dot: true, // Include dotfiles (like .eslintrc, .prettierrc)
  follow: false, // Don't follow symlinks to avoid potential loops/issues
  ignore: ['**/node_modules/**', '**/.git/**'], // Basic ignore for performance
});

logger.info(`Found ${allFiles.length} total files initially.`);

// 4. Filter files
const includedFiles: FileInfo[] = [];
for (const absolutePath of allFiles) {
  const relativePath = path.relative(repoPath, absolutePath).replace(/\\/g, '/');

  // Use forward slashes
  // Skip if ignored by .gitignore rules or always-ignore list
  if (ig.ignores(relativePath)) {
    logger.debug(`Ignoring (gitignore): ${relativePath}`);
    continue;
  }

  // Skip binary files based on extension
  const extension = path.extname(absolutePath).substring(1).toLowerCase();
  if (BINARY_EXTENSIONS.has(extension)) {
    logger.debug(`Ignoring (binary extension): ${relativePath}`);
    continue;
  }

  // Skip potentially very large files (e.g., > 5MB) - adjust as needed
  try {
    const stats = await fs.stat(absolutePath);
    if (stats.size > 5 * 1024 * 1024) {

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        logger.warn(`Ignoring (large file > 5MB): ${relativePath}`);
        continue;
    }
} catch (error) {
    logger.warn(`Could not get stats for ${relativePath}: ${(error as Error).message}`);
    continue; // Skip if stats fail
}

// If we reach here, include the file
try {
    const content = await fs.readFile(absolutePath, 'utf-8');
    // Basic check for binary content (presence of null bytes) - might need refinement
    if (content.includes('\u0000')) {
        logger.debug(`Ignoring (likely binary content): ${relativePath}`);
        continue;
    }

    includedFiles.push({
        absolutePath,
        relativePath,
        content,
        extension,
        language: '', // Language will be detected later
    });
} catch (error) {
    // Might fail if it's not UTF-8, likely binary
    logger.warn(`Could not read file ${relativePath} as UTF-8 (skipping): ${(error as Error)
    }.message`);
}

logger.success(`Found ${includedFiles.length} relevant code files to include.`);
return includedFiles;
}

```

```

import path from 'path';
import { findCodeFiles } from './file-finder';
import { highlightCode } from './syntax-highlighter';
import { generatePdf } from './pdf-renderer';
import { PdfOptions, HighlightedFile } from './utils/types';
import { getTheme } from './utils/themes';
import { logger } from './utils/logger';

/**
 * Main orchestration function for the xprinto tool.
 *
 * @param repoPath Absolute path to the repository/directory.
 * @param options PDF generation options from the CLI.
 */
export async function run(repoPath: string, options: PdfOptions): Promise<void> {
  try {
    logger.info(`Processing repository: ${repoPath}`);
    logger.info(`Output PDF: ${options.output}`);
    logger.info(`Theme: ${options.theme}, Font Size: ${options.fontSize}, Line Numbers: ${options.showLineNumbers}`);
    // 1. Find relevant code files
    const filesToProcess = await findCodeFiles(repoPath);

    if (filesToProcess.length === 0) {
      logger.warn("No relevant code files found to process in the specified path.");
      return;
    }

    // 2. Load the selected theme
    const theme = getTheme(options.theme);
    logger.info(`Using theme: ${options.theme}`);

    // 3. Highlight code for each file
    logger.info("Applying syntax highlighting...");
    const highlightedFiles: HighlightedFile[] = filesToProcess.map(fileInfo => {
      return highlightCode(fileInfo, theme);
    });
    logger.info("Syntax highlighting complete.");

    // 4. Generate the PDF
    logger.info("Generating PDF document...");
    const repoName = path.basename(repoPath); // Use directory name for cover page
    await generatePdf(highlightedFiles, options, theme, repoName);

  } catch (error) {
    logger.error(`An unexpected error occurred: ${(error as Error).message}`);
    // Log stack trace in verbose mode
    if (process.env.XP_VERBOSE === 'true') { // Check env var set by CLI perhaps
      console.error((error as Error).stack);
    }
    // Ensure the process exits with an error code if run from CLI
    process.exitCode = 1;
  }
}

```



```

import PDFDocument from 'pdfkit';
import fs from 'fs-extra';
import path from 'path';
import { HighlightedFile, HighlightedLine, HighlightedToken, PdfOptions, SyntaxTheme } from
import { Logger } from './utils/logger';

// --- Constants ---
const POINTS_PER_INCH = 72;
const DEFAULT_LINE_HEIGHT_MULTIPLIER = 1.4; // Adjust for code readability
const TOC_INDENT = 20; // Points to indent file names under directories in TOC
const WRAP_INDENT_MULTIPLIER = 2; // How many characters to indent wrapped lines
const TOC_DOT_PADDING = 5; // Points padding around dots
const CODE_BLOCK_PADDING = 10; // Padding inside the code block container

// --- Helper Functions ---

/**
 * Converts paper size name to points array or returns the array.
 */
function getPaperSizeInPoints(size: PdfOptions['paperSize']): [number, number] {
  if (Array.isArray(size)) {
    return size;
  }
  switch (size.toUpperCase()) {
    case 'LETTER':
      return [8.5 * POINTS_PER_INCH, 11 * POINTS_PER_INCH];
    case 'A4':
    default:
      return [595.28, 841.89]; // A4 dimensions in points
  }
}

/**
 * Calculates the available content height on a page.
 */
function getContentHeight(doc: PDFKit.PDFDocument, options: PdfOptions): number {
  const pageHeight = doc.page.height;
  return pageHeight - options.margins.top - options.margins.bottom - options.headerHeight - options.footerHeight;
}

/**
 * Calculates the available content width on a page.
 */
function getContentWidth(doc: PDFKit.PDFDocument, options: PdfOptions): number {
  const pageWidth = doc.page.width;
  return pageWidth - options.margins.left - options.margins.right;
}

// --- PDF Rendering Sections ---

/**
 * Adds a cover page to the PDF document.
 */
function addCoverPage(doc: PDFKit.PDFDocument, options: PdfOptions, repoName: string): void {
  // Ensure we always add a page, even if it's the very first one
  doc.addPage();
  const contentWidth = getContentWidth(doc, options);
  const contentHeight = getContentHeight(doc, options); // Use full page height for cover
  const centerX = doc.page.margins.left + contentWidth / 2;

```

```

// Title
doc.font(options.textFont + '-Bold')
  .fontSize(24)
  .text(options.title, doc.page.margins.left, doc.page.margins.top + contentHeight * 0.2, { align
: 'center', width: contentWidth });
doc.moveDown(2);

// Repository Name
doc.font(options.textFont)
  .fontSize(16)
  .text(`Repository: ${repoName}`, { align: 'center', width: contentWidth });

doc.moveDown(1);

// Generation Date
doc.fontSize(12)
  .fillColor('#555555') // Use a less prominent color
  .text(`Generated: ${new Date().toLocaleString()}`, { align: 'center', width: contentWidth });

logger.info('Added cover page.');
```

```

}

/**
 * Adds a Table of Contents page.
 */
function addTableOfContents(
  doc: PDFKit.PDFDocument,
  files: HighlightedFile[],
  options: PdfOptions,
  theme: SyntaxTheme,
  pageNumberOffset: number // Starting page number for files (after cover/TOC)
): Record<string, number> { // Returns map of relativePath to starting page number

  // Ensure we always add a page for the TOC
  doc.addPage();
  const contentWidth = getContentWidth(doc, options);
  const startY = doc.page.margins.top;
  doc.y = startY;

  // TOC Title
  doc.font(options.textFont + '-Bold')
    .fontSize(18)
    .fillColor(theme.defaultColor) // Use theme default color
    .text(options.tocTitle, { align: 'center', width: contentWidth });

  doc.moveDown(2);

  // Group files by directory
  const filesByDir: Record<string, HighlightedFile[]> = {};
  files.forEach(file => {
    const dir = path.dirname(file.relativePath);
    const dirKey = (dir === '.' || dir === '/') ? '/' : `/${dir.replace(/\\/g, '/')}`;
    if (!filesByDir[dirKey]) filesByDir[dirKey] = [];
    filesByDir[dirKey].push(file);
  });

  // Estimate page numbers BEFORE drawing TOC
  const pageEstimates: Record<string, number> = {}; // relativePath -> startPage
  let estimatedCurrentPage = pageNumberOffset;

```

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// Recalculate linesPerPage based on the current document's font size for TOC
const tocLineHeight = 12 * 1.2; // Estimate TOC line height
const tocLinesPerPage = Math.floor(getContentHeight(doc, options) / tocLineHeight);
// Estimate pages needed for code files
const codeLinesPerPage = Math.floor(getContentHeight(doc, options) / (options.fontSize *
DEFAULT_LINE_HEIGHT_MULTIPLIER));

const sortedDirs = Object.keys(filesByDir).sort();
for (const dir of sortedDirs) {
    const sortedFiles = filesByDir[dir].sort((a, b) => a.relativePath.localeCompare(b.relativePath
));
    for (const file of sortedFiles) {
        pageEstimates[file.relativePath] = estimatedCurrentPage;
        const lineCount = file.highlightedLines.length;
        const estimatedPagesForFile = Math.max(1, Math.ceil(lineCount / codeLinesPerPage));
        estimatedCurrentPage += estimatedPagesForFile;
    }
}
logger.debug(`Estimated total pages (including cover/TOC): ${estimatedCurrentPage - 1}`);

// Render TOC using estimated page numbers
doc.font(options.textFont).fontSize(12);
const tocStartY = doc.y;
const tocEndY = doc.page.height - options.margins.bottom;

for (const dir of sortedDirs) {
    // Check if space is running out for directory header AND at least one file entry
    if (doc.y > tocEndY - (tocLineHeight * 2)) {
        doc.addPage();
        doc.y = doc.page.margins.top; // Reset Y to top margin
        // Re-render TOC title maybe? Or just continue entries. For now, continue.
    }

    // Directory Header
    if (dir !== '/') {
        doc.moveDown(1);
        doc.font(options.textFont + '-Bold')
            .fillColor(theme.defaultColor) // Use theme default color
            .text(dir, { continued: false });
        doc.moveDown(0.5);
    }

    // Files in Directory
    const sortedFiles = filesByDir[dir].sort((a, b) => a.relativePath.localeCompare(b.relativePath
));
    for (const file of sortedFiles) {
        // Check for page break before file entry
        if (doc.y > tocEndY - tocLineHeight) {
            doc.addPage();
            doc.y = doc.page.margins.top; // Reset Y to top margin
        }

        const fileName = path.basename(file.relativePath);
        const pageNum = pageEstimates[file.relativePath]?.toString() || '?';
        const indent = (dir === '/') ? 0 : TOC_INDENT;
        const startX = doc.page.margins.left + indent;
        const availableWidth = contentWidth - indent;
        const currentY = doc.y;

        // --- Calculate positions ---
        doc.font(options.textFont).fontSize(12).fillColor(theme.defaultColor);

```

```

    const nameWidth = doc.widthOfString(fileName);
    const pageNumWidth = doc.widthOfString(pageNum);

    const fileNameEndX = startX + nameWidth;
    const pageNumStartX = doc.page.margins.left + contentWidth - pageNumWidth;
    // Right align page number
    // --- Render file name ---
    doc.text(fileName, startX, currentY, {
        width: nameWidth, // Use measured width to prevent unwanted wrapping
        lineBreak: false,
        continued: false // Important: Don't continue after filename
    });

    // --- Render page number ---
    // Explicitly set the position for the page number
    doc.text(pageNum, pageNumStartX, currentY, {
        width: pageNumWidth,
        lineBreak: false,
        continued: false // Important: Don't continue after page number
    });

    // --- Render dots (if space allows) ---
    const dotsStartX = fileNameEndX + TOC_DOT_PADDING;
    const dotsEndX = pageNumStartX - TOC_DOT_PADDING;
    const dotsAvailableWidth = dotsEndX - dotsStartX;

    if (dotsAvailableWidth > doc.widthOfString('. ')) {
        const dot = '. ';
        const dotWidth = doc.widthOfString(dot);
        const numDots = Math.floor(dotsAvailableWidth / dotWidth);
        const dotsString = dot.repeat(numDots);

        doc.fillColor('#aaaaaa'); // Lighter color for dots
        // Draw dots at the correct Y position, between filename and page number
        doc.text(dotsString, dotsStartX, currentY, {
            width: dotsAvailableWidth, // Use calculated width
            lineBreak: false,
            continued: false // Ensure this doesn't interfere
        });
    }

    // Move down AFTER rendering all parts of the line
    doc.moveDown(0.6);
}

}

logger.info('Added Table of Contents.');
```

return pageEstimates;

```

}

/**
 * Renders the header for a code page.
 */
function renderHeader(doc: PDFKit.PDFDocument, file: HighlightedFile, options: PdfOptions, theme:
    SyncTheme) {
    const headerY = options.margins.top;
    const headerContentY = headerY + (options.headerHeight - 9) / 2; // Vertically center ~9pt text
    const contentWidth = getContentWidth(doc, options);
    const startX = options.margins.left;

    // Background

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    doc.rect(startX, headerY, contentWidth, options.headerHeight)
      .fillColor(theme.headerFooterBackground)
      .fill();

    // File Path (truncated if too long)
    doc.font(options.textFont)
      .fontSize(9)
      .fillColor(theme.headerFooterColor)
      .text(file.relativePath, startX + CODE_BLOCK_PADDING, headerContentY, { // Use padding
        width: contentWidth - (CODE_BLOCK_PADDING * 2), // Adjust width for padding
        align: 'left',
        lineBreak: false,
        ellipsis: true
      });

    // Border line below header
    doc.moveTo(startX, headerY + options.headerHeight)
      .lineTo(startX + contentWidth, headerY + options.headerHeight)
      .lineWidth(0.5)
      .strokeColor(theme.borderColor)
      .stroke();
  }

  /**
   * Renders the footer for a code page.
   */
  function renderFooter(doc: PDFKit.PDFDocument, currentPage: number, options: PdfOptions, theme:
    SyntaxTheme): void {
    const footerY = doc.page.height - options.margins.bottom - options.footerHeight;
    const footerContentY = footerY + (options.footerHeight - 9) / 2; // Vertically center ~9pt text
    const contentWidth = getContentWidth(doc, options);
    const startX = options.margins.left;

    // Border line above footer
    doc.moveTo(startX, footerY)
      .lineTo(startX + contentWidth, footerY)
      .lineWidth(0.5)
      .strokeColor(theme.borderColor)
      .stroke();

    // Page Number
    doc.font(options.textFont)
      .fontSize(9)
      .fillColor(theme.headerFooterColor)
      .text(`Page ${currentPage}`, startX, footerContentY, { // Use calculated Y
        width: contentWidth,
        align: 'center'
      });
  }

  /**
   * Renders the highlighted code for a file, handling line numbers, wrapping, and page breaks.
   */
  function renderCodeFile(
    doc: PDFKit.PDFDocument,
    file: HighlightedFile,
    options: PdfOptions,
    theme: SyntaxTheme,
    initialPageNumber: number // This is the LOGICAL page number this file starts on
  ): number { // Returns the last PHYSICAL page number used by this file

```

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let currentPage = initialPageNumber; // Track the logical page number for the footer
const contentWidth = getContentWidth(doc, options);
const contentHeight = getContentHeight(doc, options);
const startY = options.margins.top + options.headerHeight;
const endY = doc.page.height - options.margins.bottom - options.footerHeight;
const startX = options.margins.left;
const lineHeight = options.fontSize * DEFAULT_LINE_HEIGHT_MULTIPLIER;

// Calculate line number column width
const maxLineNumDigits = String(file.highlightedLines.length).length;
// Ensure minimum width for line numbers, add padding
const lineNumberWidth = options.showLineNumbers ? Math.max(maxLineNumDigits * options.fontSize * 0.65, CODE_BLOCK_PADDING_RIGHT) : CODE_BLOCK_PADDING_RIGHT;
const lineNumberPaddingRight = CODE_BLOCK_PADDING_RIGHT - lineNumberWidth;
// Adjust codeStartX based on whether line numbers are shown
const codeStartX = startX + (options.showLineNumbers ? lineNumberWidth + lineNumberPaddingRight : CODE_BLOCK_PADDING_RIGHT);
const codeWidth = contentWidth - (codeStartX - startX) - CODE_BLOCK_PADDING;
// Construct wrap indent padding repeat(WRAP_INDENT_MULTIPLIER);
const wrapIndentWidth = doc.font(options.codeFont).fontSize(options.fontSize).widthOfString(wrapIndent);

// --- Page Setup Function ---
// This function now focuses ONLY on setting up the visual elements of a page
const setupPageVisuals = () => {
  renderHeader(doc, file, options, theme);
  renderFooter(doc, currentPage, options, theme); // Use the current logical page number
  doc.y = startY; // Reset Y position to top of content area

  // --- Draw Code Block Container ---
  doc.rect(startX, startY, contentWidth, contentHeight)
    .fillColor(theme.backgroundColor)
    .lineWidth(0.75)
    .strokeColor(theme.borderColor)
    .fillAndStroke();

  // Draw line number background and separator if shown
  if (options.showLineNumbers) {
    doc.rect(startX, startY, lineNumberWidth, contentHeight)
      .fillColor(theme.lineNumberBackground)
      .fill();
    doc.moveTo(startX + lineNumberWidth, startY)
      .lineTo(startX + lineNumberWidth, startY + contentHeight)
      .lineWidth(0.5)
      .strokeColor(theme.borderColor)
      .stroke();
  }
  // Add initial top padding
  doc.y += CODE_BLOCK_PADDING / 2;
};

// --- Initial Page Setup ---
// Add the first page for this file explicitly
doc.addPage();
setupPageVisuals(); // Set up the visuals for the first page

// --- Render Loop ---
for (const line of file.highlightedLines) {
  // Check if we need a new page BEFORE rendering the line
  // Compare current Y against the bottom edge minus padding
  if (doc.y + lineHeight > endY - CODE_BLOCK_PADDING) {
    doc.addPage();
  }
}

```

```

        currentPage++; // Increment the logical page number for the footer
        setupPageVisuals(); // Set up visuals for the new page
    }

    const currentLineY = doc.y; // Store Y position for the line

    // 1. Draw Line Number (if enabled)
    if (options.showLineNumbers) {
        // Ensure font is set before drawing text
        doc.font(options.codeFont)
            .fontSize(options.fontSize)
            .fillColor(theme.lineNumberColor)
            .text(
                String(line.lineNumber).padStart(maxLineNumDigits, ' '),
                startX + CODE_BLOCK_PADDING / 2, // Start drawing within padding
                currentLineY,
                {
                    width: lineNumberWidth - CODE_BLOCK_PADDING, // Constrain width to padded area
                    align: 'right', // Right-align within the column
                    lineBreak: false
                }
            );
    }

    // 2. Render Code Tokens (handling wrapping)
    let currentX = codeStartX; // Start code after line numbers/padding
    let isFirstTokenOfLine = true; // Flag for wrapping logic

    // Helper function to handle moving to the next line during wrapping
    const moveToNextWrapLine = () => {
        doc.y += lineHeight; // Move Y down
        // Check for page break *after* moving Y, before drawing next segment
        if (doc.y + lineHeight > endY - CODE_BLOCK_PADDING) {
            doc.addPage();
            currentPage++; // Increment logical page number
            setupPageVisuals(); // Setup visuals for new page
        }
        currentX = codeStartX + wrapIndentWidth; // Apply wrap indent for the new line
        // Draw wrap indicator if line numbers are shown
        if (options.showLineNumbers) {
            doc.font(options.codeFont).fontSize(options.fontSize).fillColor(theme.lineNumberColor)
                .text('!' + String(startX + CODE_BLOCK_PADDING / 2), doc.y, { width: lineNumberWidth -
CODE_BLOCK_PADDING, align: 'right', lineBreak: false });
        }
    };

    // Iterate through tokens for the current source line
    for (const token of line.tokens) {
        // Set font and color for the current token
        doc.font(options.codeFont + (token.fontStyle === 'bold' ? '-Bold' : token.fontStyle ===
'italic' ? '-Oblique' : ''))
            .fontSize(options.fontSize)
            .fillColor(token.color || theme.defaultColor);

        const tokenText = token.text;
        const tokenWidth = doc.widthOfString(tokenText);

        // Check if token fits on the current PDF line segment
        if (currentX + tokenWidth >= codeStartX + codeWidth) {
            // Fits: Draw it and update X
            doc.text(tokenText, currentX, doc.y, { continued: true, lineBreak: false });
        }
    }

```

```

        currentX += tokenWidth;
    } else {
        // Needs wrapping: Process character by character or segment by segment
        let remainingText = tokenText;

        // If it's not the first token, move to the next line immediately
        if (!isFirstTokenOfLine) {
            moveToNextWrapLine();
        }

        while (remainingText.length > 0) {
            let fitsChars = 0;
            let currentSegmentWidth = 0;
            // Available width on the current (potentially wrapped) line
            const availableWidth = (codeStartX + codeWidth) - currentX;

            // Find how many characters fit
            for (let i = 1; i <= remainingText.length; i++) {
                const segment = remainingText.substring(0, i);
                const width = doc.widthOfString(segment);
                if (width <= availableWidth) {
                    fitsChars = i;
                    currentSegmentWidth = width;
                } else {
                    break; // Exceeded available width
                }
            }

            if (fitsChars === 0 && remainingText.length > 0) {
                // Cannot fit even one character - force at least one
                // This might happen if wrapIndentWidth makes the line too narrow
                fitsChars = 1;
                currentSegmentWidth = doc.widthOfString(remainingText[0]);
                logger.warn(`Cannot fit character '${remainingText[0]}' on wrapped line
${line.lineNumber} ⚠️ ${file.relativePath}.`);

                const textToDraw = remainingText.substring(0, fitsChars);
                // Draw the segment that fits
                doc.text(textToDraw, currentX, doc.y, { continued: true, lineBreak: false });

                currentX += currentSegmentWidth;
                remainingText = remainingText.substring(fitsChars);

                // If there's more text in this token, move to the next line
                if (remainingText.length > 0) {
                    moveToNextWrapLine();
                }
            } // End while remainingText in token
        } // End else (wrapping needed)
        isFirstTokenOfLine = false; // After processing the first token, this flag is false
    } // End for loop (tokens)

    // Move Y position down for the next line in the source file
    doc.y = currentLineY + lineHeight;

} // End for loop (lines)

logger.info(`Rendered file ${file.relativePath} spanning pages ${initialPageNumber}-${currentPage}
.`); // Return the physical page count used by this file.
// We need to know the actual number of pages added by doc.addPage() within this function.

```


pdf-renderer.ts

```
// This is tricky without direct access to pdfkit's internal page count *during* rendering.
// A simpler approach is to return the final logical page number.

// The main function in this file has a bug that can be lead to inaccurate TOC numbers if wrapping causes
// a page to be rendered as multiple pages.
// This is a workaround for that.
// A simpler approach is to return the final logical page number.

// --- Main PDF Generation Function ---

/**
 * Generates the PDF document from highlighted files.
 */
export async function generatePdf(
  files: HighlightedFile[],
  options: PdfOptions,
  theme: SyntaxTheme,
  repoName: string
): Promise<void> {
  logger.info(`Starting PDF generation for ${files.length} files.`);
  const startTime = Date.now();

  const doc = new PDFDocument({
    size: getPaperSizeInPoints(options.paperSize),
    margins: options.margins,
    autoFirstPage: false, // We explicitly add all pages
    bufferPages: true, // Recommended for complex layouts / page counting issues
    info: {
      Title: options.title,
      Author: 'xprinto',
      Creator: 'xprinto',
      CreationDate: new Date(),
    }
  });

  const outputDir = path.dirname(options.output);
  await fs.ensureDir(outputDir);
  const writeStream = fs.createWriteStream(options.output);
  doc.pipe(writeStream);

  let physicalPageCount = 0; // Track actual pages added

  // 1. Cover Page
  addCoverPage(doc, options, repoName); // Adds page 1
  physicalPageCount = doc.bufferedPageRange().count; // Should be 1

  // 2. Table of Contents
  let tocPages = 0;
  // The logical page number where code files *should* start (after cover + TOC)
  let fileStartLogicalPageNumber = physicalPageCount + 1;

  if (files.length > 1) {
    const tocStartPhysicalPage = physicalPageCount + 1;
    // Pass the estimated logical start page for files to TOC for its calculations
    addTableOfContents(doc, files, options, theme, fileStartLogicalPageNumber); // Adds TOC page(s)
    const tocEndPhysicalPage = doc.bufferedPageRange().count;
    tocPages = tocEndPhysicalPage - physicalPageCount;
    physicalPageCount = tocEndPhysicalPage; // Update physical page count
    // Update the logical start page number for files *after* TOC is rendered
    fileStartLogicalPageNumber = physicalPageCount + 1;
  }
}
```

```

    logger.info(`Table of Contents added (${tocPages} page(s)). Files will start on logical page
    ${fileStartLogicalPageNumber}. Current physical page count: ${physicalPageCount}`);
    logger.info('Skipping Table of Contents (single file).');
    // fileStartLogicalPageNumber remains physicalPageCount + 1
  }

  // 3. Render Code Files
  let lastLogicalPageNumber = physicalPageCount; // Track the logical page number for the footer

  const sortedFiles = files.sort((a, b) => a.relativePath.localeCompare(b.relativePath));

  for (const file of sortedFiles) {
    // Pass the correct starting logical page number for this file
    const currentFileStartLogicalPage = lastLogicalPageNumber + 1;
    logger.debug(`Rendering file: ${file.relativePath}, starting on logical page
    ${currentFileStartLogicalPage} the last logical page number used by that file
    lastLogicalPageNumber`);
    lastLogicalPageNumber = renderCodeFile(doc, file, options, theme, currentFileStartLogicalPage);
  }

  // --- Finalize PDF ---
  // The page numbers in the footer should now be correct based on the logical flow.
  // The actual physical page count might differ slightly if TOC estimation was off,
  // but the footer numbering should be consistent.
  doc.end();

  await new Promise<void>((resolve, reject) => {
    writeStream.on('finish', () => {
      const endTime = Date.now();
      logger.success(`PDF generated successfully: ${options.output}`);
      logger.info(`Total generation time: ${((endTime - startTime) / 1000).toFixed(2)} seconds.`);
      resolve();
    });
    writeStream.on('error', (err) => {
      logger.error(`Error writing PDF file: ${err.message}`);
      reject(err);
    });
  });
}

```

```

import hljs from 'highlight.js';
import { FileInfo, HighlightedFile, HighlightedLine, HighlightedToken, SyntaxTheme } from
import { Logger } from './utils/logger';
import he from 'he'; // Use 'he' library for robust HTML entity decoding

// --- Language Mapping ---
// Add mappings for extensions highlight.js might not guess correctly
const LANGUAGE_MAP: Record<string, string> = {
  'ts': 'typescript',
  'tsx': 'typescript',
  'js': 'javascript',
  'jsx': 'javascript',
  'py': 'python',
  'rb': 'ruby',
  'java': 'java',
  'cs': 'csharp',
  'go': 'go',
  'php': 'php',
  'html': 'html',
  'css': 'css',
  'scss': 'scss',
  'less': 'less',
  'json': 'json',
  'yaml': 'yaml',
  'yml': 'yaml',
  'md': 'markdown',
  'sh': 'bash',
  'bash': 'bash',
  'zsh': 'bash',
  'sql': 'sql',
  'xml': 'xml',
  'kt': 'kotlin',
  'swift': 'swift',
  'pl': 'perl',
  'rs': 'rust',
  'lua': 'lua',
  'dockerfile': 'dockerfile',
  'h': 'c', // Often C or C++ header
  'hpp': 'cpp',
  'cpp': 'cpp',
  'c': 'c',
  'm': 'objective-c',
  'mm': 'objective-c',
  // Add more as needed
};

// --- Theme Mapping ---
// Maps highlight.js CSS classes to theme token types
function mapHljsClassToThemeToken(className: string): keyof SyntaxTheme['tokenColors'] | null {
  if (className.includes('comment')) return 'comment';
  if (className.includes('keyword')) return 'keyword';
  if (className.includes('string')) return 'string';
  if (className.includes('number')) return 'number';
  if (className.includes('literal')) return 'literal'; // true, false, null
  if (className.includes('built_in')) return 'built_in'; // console, Math
  if (className.includes('function')) return 'function'; // Function definition keyword
  // Check for title but exclude class titles specifically
  if (className.includes('title') && !className.includes('class')) return 'title';
  if (className.includes('class')) return 'class';
  if (className.includes('params')) return 'params'; // Function parameters
}

```

```

    if (className.includes('property')) return 'property'; // Object properties
    if (className.includes('operator')) return 'operator';
    if (className.includes('punctuation')) return 'punctuation';
    if (className.includes('tag')) return 'tag'; // HTML/XML tags
    if (className.includes('attr') || className.includes('attribute')) return 'attr';
    // if (className.includes('variable')) return 'variable';
    if (className.includes('regexp')) return 'regexp';
    // Add more specific mappings if needed based on highlight.js output
    return null;
}

// --- Font Style Mapping ---
function getFontStyle(className: string, theme: SyntaxTheme): HighlightedToken['fontStyle'] {
    const styles = theme.fontStyles || {};
    if (className.includes('comment') && styles.comment === 'italic') return 'italic';
    if (className.includes('keyword') && styles.keyword === 'bold') return 'bold';
    // Add more style mappings based on theme config
    return 'normal'; // Return the literal 'normal'
}

/**
 * Detects the language for highlighting based on file extension.
 * @param extension The file extension (without the dot).
 * @returns The language name recognized by highlight.js or the extension itself.
 */
function detectLanguage(extension: string): string {
    const lowerExt = extension.toLowerCase();
    return LANGUAGE_MAP[lowerExt] || lowerExt; // Fallback to extension if no mapping
}

/**
 * Parses the HTML output of highlight.js to extract tokens with styles.
 * This version aims to be more robust in handling nested spans and plain text.
 * @param highlightedHtml The HTML string generated by hljs.highlight().value
 * @param theme The syntax theme to apply colors from.
 * @returns An array of HighlightedToken objects.
 */
function parseHighlightedHtml(highlightedHtml: string, theme: SyntaxTheme): HighlightedToken[] {
    const tokens: HighlightedToken[] = [];
    // Use a simple stack-based parser approach
    const stack: { tag: string; class?: string }[] = [];
    let currentText = '';
    let currentIndex = 0;

    while (currentIndex < highlightedHtml.length) {
        const tagStart = highlightedHtml.indexOf('<', currentIndex);

        // Text before the next tag (or end of string)
        const textBeforeTag = tagStart === -1
            ? highlightedHtml.substring(currentIndex)
            : highlightedHtml.substring(currentIndex, tagStart);

        if (textBeforeTag) {
            currentText += textBeforeTag;
        }

        if (tagStart === -1) {
            // End of string
            if (currentText) {
                tokens.push({
                    text: currentText,
                    class: '',
                    style: {}
                });
            }
        } else {
            const tagEnd = highlightedHtml.indexOf('>', tagStart);
            const tagContent = highlightedHtml.substring(tagStart + 1, tagEnd);
            const [tag, ...classes] = tagContent.split(' ');
            const className = classes.join(' ');

            if (tag === 'span') {
                // Handle span tags
                const styleStr = tagContent.substring(tagContent.indexOf('style=') + 6, tagEnd - 1);
                const styleObj: Record<string, string> = {};
                styleStr.split(';').forEach((pair) => {
                    const [prop, value] = pair.split(':');
                    styleObj[prop.trim()] = value.trim().replace(/"/g, '');
                });

                currentText += textBeforeTag;
                tokens.push({
                    text: currentText,
                    class: className,
                    style: styleObj
                });
                currentText = '';
                currentIndex = tagEnd + 1;
            } else {
                // Handle other tags (e.g., <div>, <p>)
                stack.push({ tag, class: className });
                currentText += textBeforeTag;
                currentIndex = tagEnd + 1;
            }
        }
    }
}

```

```

        const decodedText = he.decode(currentText); // Decode entities
        const currentStyle = stack[stack.length - 1];
        const themeKey = currentStyle?.class ? mapHljsClassToThemeToken(currentStyle.class) :
null;
        tokens.push({
            text: decodedText,
            color: themeKey ? theme.tokenColors[themeKey] : theme.defaultColor,
            fontStyle: currentStyle?.class ? getFontStyle(currentStyle.class, theme) : 'normal'
, // Use 'normal' literal
        })
        break; // Exit loop
    }

    const tagEnd = highlightedHtml.indexOf('>', tagStart);
    if (tagEnd === -1) {
        // Malformed HTML? Treat rest as text
        logger.warn("Malformed HTML detected in highlighter output.");
        currentText += highlightedHtml.substring(tagStart);
        if (currentText) {
            const decodedText = he.decode(currentText);
            const currentStyle = stack[stack.length - 1];
            const themeKey = currentStyle?.class ? mapHljsClassToThemeToken(currentStyle.class) :
null;
            tokens.push({
                text: decodedText,
                color: themeKey ? theme.tokenColors[themeKey] : theme.defaultColor,
                fontStyle: currentStyle?.class ? getFontStyle(currentStyle.class, theme) :
'normal', // Use 'normal' literal
            })
            break;
        }
    }

    const tagContent = highlightedHtml.substring(tagStart + 1, tagEnd);
    const isClosingTag = tagContent.startsWith('

```

```

        const classAttrMatch = tagContent.match(/class="([^"]*)"/);
        if (classAttrMatch) {
            className = classAttrMatch[1];
        }
        stack.push({ tag: tagName, class: className });
    }

    currentIndex = tagEnd + 1;
}

// Filter out empty tokens that might result from decoding/parsing artifacts
return tokens.filter(token => token.text.length > 0);
}

/**
 * Highlights the code content of a file.
 * @param fileInfo Information about the file.
 * @param theme The syntax theme to use for colors.
 * @returns A HighlightedFile object with tokenized lines.
 */
export function highlightCode(fileInfo: FileInfo, theme: SyntaxTheme): HighlightedFile {
    const language = detectLanguage(fileInfo.extension);
    logger.debug(`Highlighting ${fileInfo.relativePath} as language: ${language}`);

    const highlightedLines: HighlightedLine[] = [];
    const lines = fileInfo.content.split(/\r?\n/); // Split into lines

    try {
        // Process line by line
        lines.forEach((line, index) => {
            let lineTokens: HighlightedToken[];

            if (line.trim() === '') {
                // Handle empty lines
                lineTokens = [{ text: '', fontStyle: 'normal', color: theme.defaultColor }];
            } else {
                // Use 'no' instead of 'any' for type inference
                // Define result type using the imported hljs object's types if needed,
                // but often type inference from the highlight functions is sufficient.
                // Using 'any' temporarily if inference fails or types are complex.
                let result: any;

                // Use 'any' on inference. Avoid 'hljs.HighlightResult' directly.
                // Try highlighting with the detected language
                if (hljs.getLanguage(language)) {
                    result = hljs.highlight(line, { language: language, ignoreIllegals: true });
                } else {
                    // Fallback to auto-detection if language is not supported
                    logger.debug(`Language '${language}' not explicitly supported by hljs, attempting auto-detect for line ${index + 1} in ${fileInfo.relativePath}`);
                    result = hljs.highlightAuto(line);
                }
                // Catch (e) {
                logger.warn(`Highlighting failed for line ${index + 1} in ${fileInfo.relativePath}, using plain text. Error: ${e instanceof Error ? e.message : ''}`);
                // Ensure the fallback structure matches HighlightResult structure minimally
                result = { value: he.encode(line), language: 'plaintext', relevance: 0 };
            }

            // Encode to mimic hljs output

            // Parse the HTML output into tokens
            // Ensure 'result.value' is a string before passing
            lineTokens = parseHighlightedHtml(result?.value || he.encode(line), theme);
        });
    } catch (e) {
        logger.error(`Error in highlightCode: ${e instanceof Error ? e.message : ''}`);
    }
}

```

```

        // If parsing results in empty tokens (shouldn't happen often), fallback
        if (lineTokens.length === 0 && line.length > 0) {
            logger.debug(`Token parsing resulted in empty array for non-empty line ${index + 1}`);
            in ${fileInfo.relativePath} = Use plaintext token theme.defaultColor, fontStyle: 'normal' });
        // Use 'normal' literal
        }

        highlightedLines.push({
            lineNumber: index + 1,
            tokens: lineTokens,
        });
    });

    } catch (error) {
        logger.error(`Critical error during highlighting process for ${fileInfo.relativePath}:
        ${error instanceof Error ? error.message : 'Unknown error'}`);
        const fallbackLines = lines.map((line, index) => ({
            lineNumber: index + 1,
            tokens: [{ text: line, color: theme.defaultColor, fontStyle: 'normal' as const }],
        // Use 'normal' literal and 'as const' for type safety
        });
        return {
            ...fileInfo,
            language: 'plaintext', // Mark as plaintext due to error
            highlightedLines: fallbackLines, // This should now match the expected type
        };
    }

    return {
        ...fileInfo,
        language: language, // Store the detected language
        highlightedLines,
    };
}

```

```
// Simple console logger with levels and colors

export enum LogLevel {
  ERROR = 'ERROR',
  WARN = 'WARN',
  INFO = 'INFO',
  DEBUG = 'DEBUG',
  SUCCESS = 'SUCCESS'
}

const COLORS = {
  [LogLevel.ERROR]: '\x1b[31m', // Red
  [LogLevel.WARN]: '\x1b[33m', // Yellow
  [LogLevel.INFO]: '\x1b[36m', // Cyan
  [LogLevel.DEBUG]: '\x1b[35m', // Magenta
  [LogLevel.SUCCESS]: '\x1b[32m', // Green
  RESET: '\x1b[0m' // Reset color
};

let isVerbose = false;

export function setVerbose(verbose: boolean): void {
  isVerbose = verbose;
  if (isVerbose) {
    log('Verbose logging enabled.', LogLevel.DEBUG);
  }
}

export function log(message: string, level: LogLevel = LogLevel.INFO): void {
  if (level === LogLevel.DEBUG && !isVerbose) {
    return; // Don't log debug messages unless verbose is enabled
  }

  const timestamp = new Date().toISOString();
  const color = COLORS[level] || COLORS.RESET;
  const reset = COLORS.RESET;

  console.log(`${color}[${timestamp}] [${level}]${reset} ${message}`);

  // Optionally add more sophisticated logging here (e.g., to a file)
}

// Convenience functions
export const logger = {
  error: (message: string) => log(message, LogLevel.ERROR),
  warn: (message: string) => log(message, LogLevel.WARN),
  info: (message: string) => log(message, LogLevel.INFO),
  debug: (message: string) => log(message, LogLevel.DEBUG),
  success: (message: string) => log(message, LogLevel.SUCCESS),
  setVerbose: setVerbose
};
```



```

import { SyntaxTheme } from './types';

// Define color themes here
// Using common hex color codes

const lightTheme: SyntaxTheme = {
  defaultColor: '#24292e', // GitHub default text
  backgroundColor: '#ffffff', // White background
  lineNumberColor: '#aaaaaa', // Light gray line numbers
  lineNumberBackground: '#f6f8fa', // Very light gray background for numbers
  headerFooterColor: '#586069', // Gray for header/footer text
  headerFooterBackground: '#f6f8fa', // Match line number background
  borderColor: '#ele4e8', // Light border color
  tokenColors: {
    comment: '#6a737d', // Gray
    keyword: '#d73a49', // Red
    string: '#032f62', // Dark blue
    number: '#005cc5', // Blue
    literal: '#005cc5', // Blue (true, false, null)
    built_in: '#005cc5', // Blue (console, Math, etc.)
    function: '#6f42c1', // Purple (function definitions)
    title: '#6f42c1', // Purple (function/class usage)
    class: '#6f42c1', // Purple (class definitions)
    params: '#24292e', // Default text color for params
    property: '#005cc5', // Blue for object properties
    operator: '#d73a49', // Red
    punctuation: '#24292e', // Default text color
    tag: '#22863a', // Green (HTML/XML tags)
    attr: '#6f42c1', // Purple (HTML/XML attributes)
    variable: '#e36209', // Orange (variables)
    regexp: '#032f62', // Dark blue
  },
  fontStyles: {
    comment: 'italic',
  }
};

const darkTheme: SyntaxTheme = {
  defaultColor: '#c9d1d9', // Light gray default text
  backgroundColor: '#0d1117', // Very dark background
  lineNumberColor: '#8b949e', // Medium gray line numbers
  lineNumberBackground: '#161b22', // Slightly lighter dark background
  headerFooterColor: '#8b949e', // Medium gray for header/footer
  headerFooterBackground: '#161b22', // Match line number background
  borderColor: '#30363d', // Dark border color
  tokenColors: {
    comment: '#8b949e', // Medium gray
    keyword: '#ff7b72', // Light red/coral
    string: '#a5d6ff', // Light blue
    number: '#79c0ff', // Bright blue
    literal: '#79c0ff', // Bright blue
    built_in: '#79c0ff', // Bright blue
    function: '#d2a8ff', // Light purple
    title: '#d2a8ff', // Light purple
    class: '#d2a8ff', // Light purple
    params: '#c9d1d9', // Default text color
    property: '#79c0ff', // Bright blue
    operator: '#ff7b72', // Light red/coral
    punctuation: '#c9d1d9', // Default text color
    tag: '#7ee787', // Light green
  }
};

```

```
    attr: '#d2a8ff',      // Light purple
    variable: '#ffa657',  // Light orange
    regexp: '#a5d6ff',    // Light blue
  },
  fontStyles: {
    comment: 'italic',
  }
};

// Add more themes here (e.g., solarized, monokai)

export const themes: Record<string, SyntaxTheme> = {
  light: lightTheme,
  dark: darkTheme,
  // Add other themes here
};

export function getTheme(themeName: string): SyntaxTheme {
  return themes[themeName.toLowerCase()] || themes.light; // Default to light theme
}
```

```

/**
 * Represents information about a file found in the repository.
 */
export interface FileInfo {
  absolutePath: string; // Full path to the file
  relativePath: string; // Path relative to the repository root
  content: string;       // File content as a string
  extension: string;     // File extension (e.g., 'ts', 'js')
  language: string;      // Detected language for highlighting
}

/**
 * Represents a single token within a line of highlighted code.
 */
export interface HighlightedToken {
  text: string;
  color?: string;        // Hex color code (e.g., '#0000ff')
  fontStyle?: 'normal' | 'italic' | 'bold' | 'bold-italic';
}

/**
 * Represents a single line of code with its tokens.
 */
export interface HighlightedLine {
  lineNumber: number;
  tokens: HighlightedToken[];
}

/**
 * Represents a file with its content processed for highlighting.
 */
export interface HighlightedFile extends FileInfo {
  highlightedLines: HighlightedLine[];
}

/**
 * Options for configuring the PDF generation process.
 */
export interface PdfOptions {
  output: string;
  title: string;
  fontSize: number;
  showLineNumbers: boolean;
  theme: string; // Identifier for the theme (maps to colors)
  // Standard PDF page sizes (points)
  paperSize: 'A4' | 'Letter' | [number, number];
  margins: { top: number; right: number; bottom: number; left: number };
  headerHeight: number;
  footerHeight: number;
  tocTitle: string;
  codeFont: string; // Font for code blocks
  textFont: string; // Font for titles, TOC, headers/footers
}

/**
 * Defines the color scheme for a syntax highlighting theme.
 */
export interface SyntaxTheme {
  defaultColor: string;
  backgroundColor: string; // Background for code blocks
}

```

```
lineNumberColor: string;
lineNumberBackground: string;
headerFooterColor: string;
headerFooterBackground: string;
borderColor: string;
tokenColors: {
  keyword?: string;
  string?: string;
  comment?: string;
  number?: string;
  function?: string; // e.g., function name definition
  class?: string;    // e.g., class name definition
  title?: string;    // e.g., function/class usage, important identifiers
  params?: string;   // Function parameters
  built_in?: string; // Built-in functions/variables
  literal?: string;  // e.g., true, false, null
  property?: string; // Object properties
  operator?: string;
  punctuation?: string;
  attr?: string;     // HTML/XML attributes
  tag?: string;      // HTML/XML tags
  variable?: string; // Variable declarations/usage
  regexp?: string;
  // Add more specific highlight.js scopes as needed
};
fontStyles?: { // Optional font styles
  comment?: 'italic';
  keyword?: 'bold';
  // Add more styles
};
}
```