PowerShell Script Analysis Improvements

Overview

This document outlines the improvements made to the PowerShell script analysis system in PSScript. The enhanced analyzer now provides consistent rating scales, better explanations, and comprehensive Microsoft Learn documentation references.

Key Improvements

1. Enhanced Rating Scales

The analyzer now uses consistent, well-defined rating scales for all evaluations:

Security Score (1-10)

- **1-3**: Minimal security risks - Safe for production use
- **4-6**: Moderate security risks - Address issues before production use
- **7-10**: Severe security risks - Requires immediate attention before use

Code Quality Score (1-10)

- **8-10**: Excellent code quality - Follows best practices
- **5-7**: Acceptable code quality - Some improvements needed
- **1-4**: Poor code quality - Significant refactoring required

Risk Score (1-10)

- **1-3**: Minimal execution risk - Safe to execute in most environments
- **4-6**: Moderate execution risk - Use with caution, test thoroughly first
- **7-10**: High execution risk - Careful review and controlled environment required

Reliability Score (1-10)

- **8-10**: Robust code with excellent error handling
- **5-7**: Adequate error handling with some improvements needed
- **1-4**: Poor error handling requiring significant improvements

2. Microsoft Learn Documentation Integration

Each analyzed script now includes relevant Microsoft Learn documentation references with:

- Command/concept name

- Full URL to the Microsoft documentation
- Brief description of what the documentation covers

This helps users understand the PowerShell commands used in the script and provides easy access to official documentation.

3. Improved Analysis Details

- More comprehensive command details including purpose and potential risks
- Better categorization of scripts based on their functionality
- More actionable optimization suggestions

Implementation Details

Core Components Updated

1. **AI Script Analyzer** (`/src/ai/analysis/script_analyzer.py`)
2. Updated prompt templates with clear rating guidelines
3. Added structure for Microsoft Learn documentation references

4. Improved field mapping for consistent results

5. **Backend Integration** (`/src/backend/src/controllers/ScriptController.ts`)

6. Fixed field mapping between AI analysis and database storage
7. Added support for MS Learn documentation references

8. Updated analysis storage format

9. **Batch Analysis Tools**

10. Added `update-script-analysis.js` for batch updating existing scripts
11. Created shell script for easy execution of the update process

User Interface Updates

The script detail and analysis pages now show:

- Clear rating indicators with explanations
- Links to relevant Microsoft Learn documentation
- More actionable improvement suggestions

Running the Update

To re-analyze all existing scripts with the improved analyzer:

```
# Make the script executable
chmod +x update-all-script-analysis.sh

# Run the update
./update-all-script-analysis.sh
```

This will process all scripts in batches and update their analysis information in the database.

Technical Notes

- The analysis uses the OpenAI API with GPT-4o model for high-quality results
- Analysis results are cached to improve performance and reduce API costs
- The analyzer includes fallback mechanisms for handling errors
- Batch processing is used with configurable concurrency and rate limiting

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