**Application Assessment Software**

**Requirements and Technical Specifications Document**

**Version 1.0**

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**1. Executive Summary**

**1.1 Purpose**

This document defines the requirements and technical specifications for an AI-powered Application Assessment Software platform that leverages advanced language models (Claude and GPT) to analyze, evaluate, and provide recommendations for enterprise application portfolios, infrastructure, and development practices.

**1.2 Solution Overview**

A cloud-native assessment platform hosted on Microsoft Azure that automates the evaluation of business applications through AI-driven analysis, providing visual insights, scoring metrics, and actionable recommendations for modernization and improvement.

**1.3 Key Capabilities**

* AI-powered code and infrastructure analysis using Claude and GPT models
* Automated assessment scoring across multiple dimensions
* Interactive dashboards with visual analytics
* Intelligent recommendation engine with prioritized actions
* Comprehensive assessment report generation
* Multi-tenant architecture with enterprise-grade security

**2. Business Requirements**

**2.1 Functional Requirements**

**2.1.1 Assessment Management**

The system shall provide comprehensive assessment project management capabilities including creation, tracking, and collaboration features. Users must be able to initiate multiple concurrent assessments for different applications, monitor progress in real-time, and maintain historical assessment data for trend analysis. The platform will support team collaboration with role-based access control, enabling different stakeholders to contribute to and review assessments based on their permissions.

**2.1.2 AI-Powered Analysis Capabilities**

The system shall leverage Claude and GPT-4 models to perform deep analysis across multiple dimensions. This includes source code quality evaluation, architectural pattern recognition, security vulnerability detection, infrastructure configuration assessment, DevOps maturity evaluation, and database performance analysis. The AI models will process various input formats including source code repositories, configuration files, infrastructure-as-code templates, CI/CD pipeline definitions, and database schemas.

**2.1.3 Scoring and Metrics System**

A comprehensive scoring framework shall evaluate each assessment area on a 0-100 scale with weighted aggregation for overall grades. The scoring system will cover code quality metrics, security posture, infrastructure resilience, DevOps maturity, database optimization, documentation completeness, and technical debt quantification. Industry-specific benchmarks will provide context for scores, enabling organizations to understand their position relative to peers.

**2.1.4 Visualization and Dashboard Requirements**

The platform shall present assessment findings through intuitive visual representations. Dashboard components will include executive summary views with key metrics and trends, detailed drill-down capabilities for each assessment area, comparative analysis across multiple assessments, and heat maps for risk visualization. Real-time updates will reflect ongoing analysis progress, and customizable dashboard layouts will accommodate different user preferences and roles.

**2.1.5 Recommendation Engine**

An intelligent recommendation system shall generate actionable improvement suggestions based on assessment findings. Recommendations will be prioritized using an effort-versus-impact matrix, categorized into quick wins, medium-term improvements, and strategic initiatives. Each recommendation will include detailed implementation guidance, estimated effort and timeline, expected benefits and ROI, and relevant best practice references.

**2.2 Non-Functional Requirements**

**2.2.1 Performance Requirements**

The system must handle large-scale assessments efficiently, supporting analysis of applications with up to 10 million lines of code. Basic assessments should complete within 30 minutes, while comprehensive deep-dive analyses may extend to 2 hours. Dashboard interfaces must load within 2 seconds, and API responses should return within 500 milliseconds for 95% of requests. The platform should support 100 concurrent users without performance degradation.

**2.2.2 Security Requirements**

Enterprise-grade security measures shall protect all assessment data and intellectual property. This includes end-to-end encryption for data in transit and at rest, multi-factor authentication with Azure Active Directory integration, role-based access control with fine-grained permissions, and comprehensive audit logging for compliance. The platform must achieve SOC 2 Type II certification and comply with GDPR, CCPA, and other relevant data privacy regulations.

**2.2.3 Scalability Requirements**

The architecture must support elastic scaling to accommodate varying workloads. Auto-scaling capabilities will adjust resources based on demand, supporting from single assessments to enterprise-wide portfolio analyses. The multi-tenant architecture will ensure resource isolation while maintaining efficiency. The system should handle 1000+ assessments monthly with the ability to process up to 100GB of analysis data per assessment.

**2.2.4 Availability and Reliability**

The platform shall maintain 99.9% uptime availability with comprehensive disaster recovery capabilities. This includes automated backup procedures with point-in-time recovery, multi-region deployment options for geographic redundancy, zero-downtime deployment strategies for updates, and graceful degradation during partial service outages.

**3. Technical Architecture**

**3.1 Azure Cloud Architecture Overview**

The solution will be built entirely on Microsoft Azure, leveraging platform-as-a-service and serverless components for maximum scalability and minimal operational overhead. The architecture follows microservices principles with clear separation of concerns and independent deployment capabilities.

The frontend will be hosted on Azure Static Web Apps, providing global content delivery and automatic SSL certificates. The API layer will utilize Azure API Management for centralized gateway functionality, including authentication, rate limiting, and request routing. Backend services will run on Azure Container Apps, enabling automatic scaling and simplified container orchestration.

**3.2 Frontend Application Specifications**

**3.2.1 User Interface Design**

The frontend will be built using React with TypeScript for type safety and improved developer experience. The design system will follow Material Design principles with customizable theming to support white-labeling for enterprise clients. Responsive design will ensure optimal experience across desktop, tablet, and mobile devices.

**3.2.2 Dashboard Components**

The dashboard will feature multiple visualization types optimized for assessment data presentation. Score cards will display overall and category-specific ratings with trend indicators. Radar charts will visualize multi-dimensional assessment results, allowing quick identification of strengths and weaknesses. Heat maps will highlight risk areas and technical debt concentration. Sankey diagrams will illustrate dependencies and data flows between components. Interactive gantt charts will present implementation roadmaps with timeline and dependency management.

**3.2.3 User Experience Features**

Progressive web app capabilities will enable offline access to assessment reports. Real-time notifications will alert users to assessment completion and significant findings. Collaborative features will support comments, annotations, and sharing within teams. Export functionality will allow data extraction in various formats for external analysis.

**3.3 API Layer Design**

**3.3.1 API Architecture**

The API layer will follow RESTful principles with GraphQL support for complex data queries. Comprehensive API documentation using OpenAPI 3.0 specifications will be automatically generated and maintained. Version management will ensure backward compatibility while enabling feature evolution. Rate limiting will protect against abuse while ensuring fair resource allocation across tenants.

**3.3.2 Integration Patterns**

The API gateway will handle cross-cutting concerns including authentication, authorization, request/response transformation, and monitoring. Service mesh patterns will manage inter-service communication with circuit breakers for resilience. Event-driven architecture using Azure Service Bus will enable asynchronous processing for long-running analyses.

**3.4 AI Model Integration Strategy**

**3.4.1 Claude Integration**

Claude will serve as the primary model for code analysis and architectural assessment. The integration will utilize Claude's advanced reasoning capabilities for understanding complex code patterns, identifying architectural anti-patterns, and generating detailed improvement suggestions. Context window management will ensure efficient processing of large codebases through intelligent chunking and summarization strategies.

**3.4.2 GPT-4 Integration via Azure OpenAI**

GPT-4 through Azure OpenAI Service will complement Claude's capabilities, particularly for security analysis, documentation generation, and natural language report creation. The integration will leverage Azure's enterprise features including private endpoints, content filtering, and usage monitoring. Fine-tuning capabilities will enable model specialization for specific industries or technology stacks.

**3.4.3 Prompt Engineering Framework**

A sophisticated prompt engineering system will ensure consistent and high-quality AI analysis. Prompt templates will be versioned and tested for reliability across different scenarios. Context injection will provide relevant background information to improve analysis accuracy. Response parsing will extract structured data from AI outputs for scoring and visualization. Fallback mechanisms will handle edge cases and model unavailability.

**3.5 Data Storage Architecture**

**3.5.1 Azure Cosmos DB for Transactional Data**

Cosmos DB will store assessment metadata, scores, and recommendations with global distribution capabilities. The multi-model approach will support both document and graph data models. Partition strategies will ensure optimal performance and cost efficiency. Change feed capabilities will enable real-time updates to dashboards and reports.

**3.5.2 Azure Blob Storage for Large Artifacts**

Blob storage will house source code repositories, analysis artifacts, and generated reports. Lifecycle management policies will optimize storage costs by moving older data to cool or archive tiers. Encryption at rest with customer-managed keys will ensure data security. CDN integration will accelerate report delivery to global users.

**3.5.3 Azure SQL Database for Analytical Data**

SQL Database will support complex analytical queries and reporting requirements. Columnstore indexes will optimize aggregate queries for dashboard performance. Temporal tables will maintain historical data for trend analysis. Elastic pools will provide cost-effective resource sharing across tenants.

**3.6 Scoring System Specifications**

**3.6.1 Scoring Categories and Weights**

The scoring system will evaluate applications across twelve primary categories, each with configurable weights based on organizational priorities. Code quality assessment will examine maintainability, complexity, duplication, and test coverage. Security scoring will evaluate vulnerability presence, authentication mechanisms, and data protection measures. Infrastructure scoring will assess scalability, reliability, and disaster recovery capabilities. DevOps maturity will measure automation levels, deployment frequency, and monitoring completeness.

**3.6.2 Scoring Calculation Methodology**

Each category will receive a raw score from 0-100 based on weighted sub-metrics. Industry-specific benchmarks will provide percentile rankings for context. Trend analysis will track score improvements or degradations over time. Composite scores will aggregate category scores using customizable weighting formulas. Machine learning models will continuously refine scoring accuracy based on outcome correlation.

**3.6.3 Grade Assignment Framework**

Letter grades will provide intuitive understanding of assessment results. A+ ratings (95-100) indicate industry-leading practices. A ratings (90-94) represent excellent implementation with minor improvements possible. B ratings (80-89) suggest good practices with specific enhancement opportunities. C ratings (70-79) indicate adequate implementation requiring focused improvements. D ratings (60-69) highlight significant gaps requiring immediate attention. F ratings (below 60) identify critical issues requiring urgent remediation.

**3.7 Recommendation Engine Design**

**3.7.1 Recommendation Generation Process**

The recommendation engine will analyze assessment findings to identify improvement opportunities. Pattern matching will recognize common issues with proven solutions. Impact analysis will estimate the business value of each recommendation. Effort estimation will predict implementation complexity and resource requirements. Dependency mapping will identify prerequisite actions and parallel workstreams.

**3.7.2 Prioritization Framework**

Recommendations will be prioritized using multiple factors including business impact, implementation effort, risk reduction, and strategic alignment. Quick wins will highlight high-impact, low-effort improvements for immediate action. The system will generate phased roadmaps balancing short-term gains with long-term transformation goals. Cost-benefit analysis will support investment decision-making.

**3.7.3 Implementation Guidance**

Each recommendation will include detailed implementation guidance with step-by-step instructions, best practice references, and common pitfall warnings. Technology-specific guidance will provide framework and platform-specific advice. Resource requirements will estimate needed skills, tools, and timeline. Success metrics will define measurable outcomes for tracking progress.

**4. Implementation Specifications**

**4.1 Development Approach**

The platform will be developed using agile methodologies with two-week sprints. Continuous integration and deployment pipelines will ensure rapid feature delivery. Feature flags will enable gradual rollout and A/B testing. Comprehensive testing including unit, integration, and end-to-end tests will maintain quality.

**4.2 Deployment Architecture**

Azure Container Apps will provide serverless container hosting with automatic scaling. Azure Front Door will deliver global load balancing and DDoS protection. Azure Key Vault will manage secrets and certificates securely. Application Insights will provide comprehensive monitoring and diagnostics.

**4.3 Integration Requirements**

The platform must integrate with common development tools and platforms. Git integration will support GitHub, GitLab, and Azure DevOps repositories. JIRA and Azure Boards integration will enable work item creation from recommendations. Slack and Teams integration will provide notification and collaboration capabilities. Single sign-on will support enterprise identity providers via SAML and OAuth.

**5. Monitoring and Operations**

**5.1 Observability Strategy**

Comprehensive monitoring will ensure platform reliability and performance. Application Performance Monitoring will track response times and error rates. Distributed tracing will enable request flow analysis across microservices. Custom metrics will monitor business KPIs and AI model performance. Log aggregation will centralize debugging and audit information.

**5.2 Operational Procedures**

Automated health checks will verify service availability continuously. Self-healing capabilities will automatically restart failed services. Capacity planning will predict resource needs based on usage trends. Incident response procedures will ensure rapid issue resolution.

**6. Compliance and Governance**

**6.1 Data Governance**

Data classification will categorize information by sensitivity level. Retention policies will define storage duration for different data types. Data lineage tracking will document data flow and transformations. Privacy controls will enable GDPR-compliant data subject requests.

**6.2 Compliance Framework**

The platform will maintain compliance with industry standards including ISO 27001 for information security management, SOC 2 Type II for service organization controls, GDPR for European data privacy, and HIPAA for healthcare data where applicable.

**7. Success Metrics**

**7.1 Platform Metrics**

* Assessment completion time reduction of 50% compared to manual processes
* 95% user satisfaction rating for dashboard usability
* 99.9% platform availability achievement
* Sub-second dashboard response times for 95% of requests

**7.2 Business Outcomes**

* 30% reduction in time to identify improvement opportunities
* 40% increase in successful modernization initiatives
* 25% reduction in technical debt over 12 months
* 20% improvement in application security scores

**8. Future Enhancements**

**8.1 Roadmap Items**

* Additional AI model integration (Gemini, Llama)
* Real-time collaborative assessment sessions
* Automated code remediation suggestions
* Integration with Infrastructure-as-Code scanning
* Predictive analytics for technical debt accumulation
* Mobile application for assessment review

**8.2 Advanced Capabilities**

* Custom AI model fine-tuning for specific domains
* Automated assessment scheduling and continuous monitoring
* Integration with enterprise architecture tools
* Advanced cost optimization recommendations
* Compliance automation for specific regulations

**Appendices**

**Appendix A: Glossary of Terms**

Comprehensive definitions of technical terms, acronyms, and concepts used throughout the document.

**Appendix B: Reference Architecture Diagrams**

Detailed architectural diagrams showing component relationships, data flows, and deployment topology.

**Appendix C: API Specifications**

Complete API documentation including endpoints, request/response schemas, and authentication requirements.

**Appendix D: Scoring Rubrics**

Detailed scoring criteria for each assessment category with specific metrics and thresholds.

**Appendix E: Sample Reports**

Examples of assessment reports, dashboards, and recommendation documents.