HEALTHCARE MANAGEMENT SYSTEM
Technical Architecture Document v2.1
Prepared by: TechMed Solutions

EXECUTIVE SUMMARY
This document outlines the technical architecture and compliance requirements
for the new healthcare management platform serving Metro Health Clinic network.

STAKEHOLDER INFORMATION
- Chief Medical Officer: Dr. Sarah Johnson
- IT Director: Michael Rodriguez
- Head Nurse: Jennifer Patterson
- Practice Manager: David Kim
- Compliance Officer: Lisa Chen
- Software Architect: Alex Thompson

BUSINESS CONTEXT
- Currently serving 15,000+ active patients
- 25 healthcare providers across 3 locations
- Processing 500+ appointments daily
- Annual revenue impact: $2.5M efficiency gains expected
- Compliance deadline: Federal audit in 6 months

TECHNICAL ARCHITECTURE
Frontend: React 18 with TypeScript
Backend: Node.js with Express framework
Database: PostgreSQL with encrypted storage
Authentication: OAuth 2.0 with SAML integration
File Storage: AWS S3 with encryption at rest
API Gateway: Kong for rate limiting and security
Message Queue: Redis for real-time notifications

SECURITY AND COMPLIANCE REQUIREMENTS
- HIPAA Security Rule compliance mandatory
- SOC 2 Type II certification required
- PHI encryption in transit and at rest (AES-256)
- Multi-factor authentication for all users
- Audit logging for all data access and modifications
- Automatic session timeout after 15 minutes
- Role-based access control with principle of least privilege
- Regular security vulnerability assessments

PERFORMANCE REQUIREMENTS
- System response time under 2 seconds for 95% of requests

- Support for 200 concurrent users during peak hours
- 99.9% uptime SLA requirement
- Database backup every 4 hours with 1-hour recovery point
- Load balancing across multiple availability zones
- CDN implementation for static assets

INTEGRATION REQUIREMENTS
- HL7 FHIR R4 standard compliance for EMR integration
- Integration with existing lab systems (LabCorp, Quest)
- Pharmacy system integration for e-prescribing
- Insurance verification API connections
- Telehealth platform integration (Zoom Healthcare API)
- Billing system integration (Epic MyChart compatible)

COMPLIANCE REQUIREMENTS
- FDA 21 CFR Part 11 for electronic signatures
- State medical board reporting capabilities
- DEA controlled substance tracking
- Quality measure reporting (HEDIS, CMS)
- Patient portal requirements under 21st Century Cures Act

DATA MIGRATION
- Legacy system contains 10+ years of patient data
- Estimated 500GB of medical records and imaging
- Zero-downtime migration required
- Data validation and integrity checks mandatory
- Patient consent tracking for data use

DISASTER RECOVERY
- Recovery Time Objective (RTO): 4 hours
- Recovery Point Objective (RPO): 1 hour
- Cross-region backup replication
- Annual disaster recovery testing required
- Business continuity plan documentation

SUCCESS METRICS
- 95% user adoption within 3 months
- 40% reduction in administrative overhead
- 99.9% system availability
- Zero HIPAA compliance violations
- Patient satisfaction score improvement by 25%

TIMELINE AND BUDGET
Phase 1 (Core System): 6 months - $400K

Phase 2 (Advanced Features): 3 months - $200K
Phase 3 (Integration & Testing): 2 months - $150K
Total Project Budget: $750K
Go-live Target: September 2024