Technical Requirements: AI-Powered Invoice Processing Automation

Project Overview

Automate the manual invoice processing workflow using AI to extract data, validate information, and route approvals for our accounts payable department.

Current Architecture & Systems

Existing System Architecture

Architecture Pattern: Microservices architecture deployed on AWS
Core Platforms:

- ERP System: SAP S/4HANA (on-premise)
- Document Management: SharePoint Online
- Email System: Microsoft Exchange Online
- Database: PostgreSQL 12 on AWS RDS

Cloud Maturity: Hybrid cloud setup with 60% workloads on AWS, 40% on-premise
Current Integration Patterns:

- REST APIs for external integrations
- Message queues using Amazon SQS for asynchronous processing
- File-based integration for legacy systems

API Landscape

API Gateway: AWS API Gateway for external APIs
Internal APIs: 15+ microservices with REST endpoints
Authentication: OAuth 2.0 with JWT tokens
Rate Limiting: 1000 requests/minute per client

Integration Landscape

Systems Requiring Integration

SAP S/4HANA (Finance module)
SharePoint document library
Email system for notifications
Vendor management system
Approval workflow engine

Integration Protocols

Primary: REST APIs with JSON payloads
Secondary: SFTP for batch file transfers
Real-time Requirements: Invoice processing within 5 minutes of receipt
Batch Processing: Daily reconciliation reports

Performance Requirements

Throughput: Process 500 invoices per day (peak: 100/hour)
Latency: < 30 seconds for data extraction
Availability: 99.5% uptime during business hours (8 AM - 6 PM EST)

Data Strategy & Readiness

Data Sources
Invoice Documents: PDF, TIFF, JPEG formats via email and SharePoint
Vendor Master Data: SAP S/4HANA vendor tables
Purchase Order Data: SAP procurement module
Historical Invoice Data: 3 years of processed invoices (PostgreSQL)

Data Quality
Vendor Data: 95% accuracy, updated weekly
PO Data: 98% accuracy, real-time updates
Historical Data: Clean, structured format with consistent schema

Data Classification
Invoice Data: Internal use, contains vendor payment information
Vendor Banking Details: Confidential, PCI compliance required
Purchase Orders: Internal use, business sensitive

Data Governance
Data Retention: 7 years for financial records
Backup Strategy: Daily incremental, weekly full backups
Data Residency: All data must remain in US East region

Security & Identity

Authentication & Authorization
Identity Provider: Active Directory Federation Services (ADFS)
Multi-Factor Authentication: Required for all admin access
Role-Based Access: Finance team, AP clerks, Managers, Auditors

Encryption Standards
Data at Rest: AES-256 encryption for all databases
Data in Transit: TLS 1.3 for all API communications
Key Management: AWS KMS for encryption key rotation

Network Security
VPC Configuration: Private subnets for application tier
Firewall Rules: Restrictive ingress, controlled egress
Network Segmentation: Separate VLANs for finance applications

Observability & Operations

Monitoring Infrastructure
Application Monitoring: New Relic APM
Infrastructure Monitoring: CloudWatch for AWS resources

Log Aggregation: ELK stack (Elasticsearch, Logstash, Kibana)

Alerting
Error Rate: Alert if > 5% of invoice processing fails
Response Time: Alert if processing time > 60 seconds
System Health: CPU/Memory thresholds at 80%

Operational Procedures
Deployment Windows: Tuesday/Thursday 10 PM - 2 AM EST
Rollback Procedures: Automated rollback within 15 minutes
Incident Response: 24/7 on-call rotation for P1 issues

Model & AI Infrastructure

Current AI/ML Experience
Previous Projects: Implemented chatbot for customer service (6 months ago)
ML Platforms: Limited experience with AWS SageMaker
Data Science Team: 2 data scientists, 1 ML engineer

Foundation Models
Document Processing: Considering Amazon Textract for OCR
Natural Language: Evaluating Claude for invoice validation logic
Model Serving: Planning to use Amazon Bedrock

MLOps Maturity
Model Versioning: Basic Git-based versioning
Deployment Pipeline: Manual deployment process
Monitoring: Limited model performance tracking

Scalability & Performance

Expected Volume Growth
Current: 500 invoices/day
Year 1: 750 invoices/day (50% growth)
Year 3: 1200 invoices/day (140% growth)

Peak Load Patterns
Monthly: End-of-month spike (3x normal volume)
Daily: 9 AM - 11 AM peak processing window
Seasonal: Q4 holiday season 2x increase

Auto-scaling Requirements
Horizontal Scaling: Scale out during peak hours
Vertical Scaling: Increase compute for complex document processing

Development & Deployment

CI/CD Pipeline
Version Control: Git with GitLab
Build Process: GitLab CI with automated testing
Deployment: Blue-green deployment strategy
Testing: Unit tests (80% coverage), integration tests

Infrastructure as Code
Primary Tool: AWS CloudFormation
Configuration Management: Ansible for server configuration
Environment Parity: Dev, Test, Staging, Production environments

Testing Practices
Unit Testing: Jest for JavaScript, pytest for Python
Integration Testing: Postman collections for API testing
Performance Testing: JMeter for load testing
Security Testing: OWASP ZAP for vulnerability scanning

Compliance & Regulatory Requirements

Financial Compliance
SOX Compliance: Required for financial data processing
Audit Trail: Complete audit log for all invoice modifications
Data Retention: 7-year retention for financial records

Industry Standards
ISO 27001: Information security management
PCI DSS: For processing vendor payment information

Known Gaps & Questions

The following areas require further clarification:

1. **Disaster Recovery:** Current RTO/RPO requirements not specified
2. **Model Governance:** AI model approval and validation processes undefined
3. **Data Privacy:** Specific PII handling procedures for vendor information
4. **Cross-border Data:** International vendor data handling requirements
5. **Model Explainability:** Requirements for AI decision transparency
6. **Backup & Recovery:** Detailed backup procedures for AI models and training data

Success Metrics

Performance KPIs
Processing Time: Reduce from 45 minutes to 5 minutes per invoice
Accuracy: Achieve 95% data extraction accuracy
Cost Reduction: 60% reduction in manual processing costs

User Satisfaction: 4.5/5 rating from AP team

Technical KPIs
System Uptime: 99.5% availability
Error Rate: < 2% processing failures
Response Time: < 30 seconds for invoice processing
Throughput: Handle 100 invoices/hour during peak