Fusionix - Google Ads API Integration Design Document
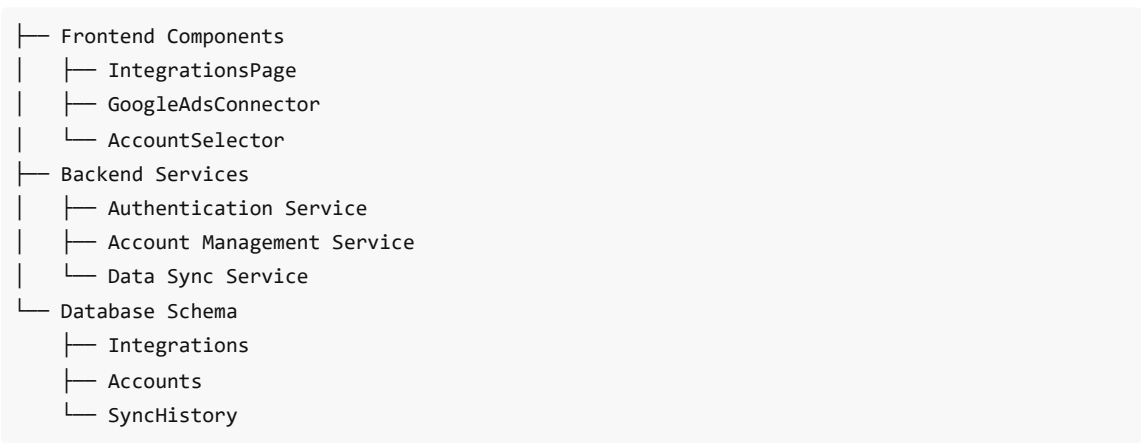
1. Overview

Fusionix is a data integration and analytics platform that provides seamless integration with various marketing platforms, including Google Ads. This document outlines the technical design and implementation of our Google Ads API integration.

2. System Architecture

2.1 Technology Stack

- Frontend: Next.js with TypeScript
- Backend: Vercel Serverless Functions (Node.js)
- Database: PostgreSQL
- Authentication: OAuth 2.0
- API Integration: Google Ads API v14

2.2 Component Architecture

```
├── Frontend Components
│   ├── IntegrationsPage
│   ├── GoogleAdsConnector
│   └── AccountSelector
├── Backend Services
│   ├── Authentication Service
│   ├── Account Management Service
│   └── Data Sync Service
└── Database Schema
    ├── Integrations
    ├── Accounts
    └── SyncHistory
```

3. Authentication Flow

3.1 OAuth 2.0 Implementation

1. User initiates Google Ads connection
2. System redirects to Google OAuth consent screen
3. User authenticates and grants permissions
4. Google returns OAuth tokens
5. System stores tokens securely
6. User provides Google Ads developer token
7. System validates and stores developer token

3.2 Security Measures

- Tokens stored encrypted in database
- HTTPS for all API communications
- Rate limiting implemented

- Regular token rotation
- Secure environment variable management

4. Data Integration

4.1 Supported Data Points

- Campaign performance metrics
- Ad group statistics
- Keyword performance
- Budget utilization
- Conversion tracking
- Audience insights

4.2 Sync Mechanisms

- Real-time data fetching
- Scheduled background sync
- Delta updates
- Error handling and retry logic

5. User Interface

5.1 Integration Flow

1. Connect Google Ads button
2. OAuth authentication
3. Developer token input
4. Account selection
5. Data sync options
6. Integration status monitoring

5.2 Dashboard Features

- Account overview
- Performance metrics visualization
- Custom report builder
- Alert configuration
- Sync status monitoring

6. Error Handling

6.1 Error Categories

- Authentication failures
- API rate limits
- Network issues
- Data validation errors
- Token expiration

6.2 Recovery Mechanisms

- Automatic token refresh
- Exponential backoff
- User notification system
- Automatic retry for transient failures

- Manual intervention triggers

7. Data Privacy and Security

7.1 Data Storage

- Encrypted at rest
- Regular backup schedule
- Data retention policies
- Access control implementation

7.2 Compliance

- GDPR compliance
- Data processing agreements
- Audit logging
- Access monitoring

8. Testing Strategy

8.1 Test Categories

- Unit tests for components
- Integration tests for API
- End-to-end flow testing
- Security testing
- Performance testing

8.2 Test Environments

- Development
- Staging
- Production

9. Monitoring and Maintenance

9.1 Monitoring

- API health checks
- Error rate tracking
- Performance metrics
- Usage statistics

9.2 Maintenance

- Regular updates
- Security patches
- Performance optimization
- Documentation updates

10. Future Enhancements

10.1 Planned Features

- Advanced reporting
- Automated optimization

- Machine learning integration
- Bulk operations support

10.2 Scalability Plans

- Horizontal scaling
- Caching implementation
- Performance optimization
- Infrastructure upgrades

11. Support and Documentation

11.1 User Documentation

- Setup guides
- Troubleshooting guides
- Best practices
- FAQ section

11.2 Technical Documentation

- API documentation
- Integration guides
- Security guidelines
- Development setup

12. Conclusion

This design document outlines the comprehensive implementation of Google Ads API integration in Fusionix. The system is designed to be secure, scalable, and user-friendly while maintaining high performance and reliability standards.