GROUP 8

JuaJobs API Design

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Resource Modeling & Entity Architecture

Core Resources

Users (**WORKER/CLIENT/ADMIN** roles) with verification states

Job Postings with location types (**REMOTE/ONSITE/HYBRID**)

Worker Profiles with skill proficiency matrices

Applications with interview scheduling & status tracking

Reviews with multi-dimensional rating systems

Strategic Additional Resources

Payment Transactions - Multi-currency, multi-method financial processing

Skills & Categories - Hierarchical taxonomy with market demand scoring

Location Services - Geo-spatial job matching with regional preferences

Messaging & Communications - Real-time, multi-language communication

Service Categories - Market segmentation with cultural adaptations

ER Diagram: [Link]

RESTful Endpoint Architecture

API Versioning Strategy

Base URL: https://api.juajobs.com/v1/

Versioning: URL-based with header support

Deprecation: 6-month notice with Sunset headers

Migration: Automated compatibility checking

Hierarchical Resources

```
/users/{id}/applications  # User's applications
/jobs/{id}/applications   # Job's applications
/applications/{id}/messages  # Application communication
/users/{id}/reviews/received  # Reviews as reviewee
/categories/{id}/skills   # Skills in category
```

```
Users & Authentication:
POST    /users                      # User registration
POST    /auth/login                 # JWT token generation
POST    /auth/refresh               # Token refresh
GET     /users/{id}/profile         # Worker profile access

Job Management:
GET     /jobs                       # Paginated job listings
POST    /jobs                       # Job creation (CLIENT only)
GET     /jobs/{id}                  # Job details with applications
PATCH   /jobs/{id}                  # Partial updates (owner only)
POST    /jobs/{id}/applications     # Application submission

Advanced Operations:
POST    /batch                      # Batch operations for mobile
GET     /jobs/{id}/analytics        # Job performance metrics
POST    /payments/initiate          # Payment processing
GET     /skills/trending            # Market trend analysis
```

Advanced Query Parameters & Intelligent Filtering

Comprehensive Parameter System

Basic Parameters

```
Pagination:        ?page=1&per_page=20
Sorting:           ?sort=created_at&order=desc
Field Selection:?fields=id,title,description
Relationships:  ?include=reviews,profile
```

Specialized Search:

```
Full-text Search: ?search=software+developer
Geo-location:      ?near=-1.2921,36.8219&radius=10km
Skills-based:      ?filter[skills]=python,javascript
```

Advanced Filtering

```
Simple Filters:    ?filter[status]=active
Multiple Values:   ?filter[status]=active,draft
Range Filters:     ?filter[created_at][gt]=2024-01-01
Complex Filters:   ?filter[and][0][status]=active&filter[and][1][country]=KE
```

Response Format:

```json
{
  "data": [...],
  "meta": {
    "current_page": 1,
    "total_pages": 5,
    "total_count": 100,
    "filters_applied": {...}
  },
  "links": {
    "self": "...", "next": "...", "prev": "..."
  }
}
```

Comprehensive Error Handling & API Versioning

HTTP Status Code Strategy

Success Codes (2xx)

200 OK - Successful operations

201 Created - Resource creation

204 No Content - Successful deletion

Client Errors (4xx)

400 Bad Request

401 Unauthorized

403 Forbidden

422 Validation Failed

Server Errors (5xx)

500 Internal Error

502 Bad Gateway

503 Service Unavailable

Standardized Error Response Format

```json
{
  "error": {
    "code": 42201,
    "message": "Validation failed for job posting",
    "error_type": "BUSINESS_ERROR",
    "details": [
      {
        "field": "payment.amount",
        "code": 42202,
        "message": "Amount must be greater than minimum wage for KE",
        "constraint": "min_value: 15000"
      }
    ],
    "request_id": "req_abc123",
    "documentation_url": "https://docs.juajobs.com/errors/42201",
    "support_reference": "ERR_2024_001"
  }
}
```

# OpenAPI & Documentation

Swagger File

....

Security Architecture

Primary: OAuth2.0 + JWT with PKCE

- Authorization Code Flow with PKCE for mobile security
- Short-lived access tokens (1 hour)
- Long-lived refresh tokens (30 days) with rotation
- RS256 asymmetric signing for token verification

Secondary: API Keys

- Scoped permissions for specific operations
- Rate limiting per API key
- Automatic key rotation capabilities
- Server-to-server authentication
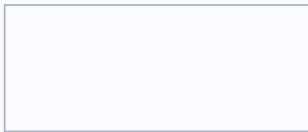
JWT Token Structure

```
{
  "iss": "https://auth.juajobs.com",
  "sub": "user_123",
  "aud": "https://api.juajobs.com",
  "exp": 1516239022,
  "iat": 1516235422,
  "scope": "read write payments",
  "role": "WORKER",
  "permissions": ["job:apply", "profile:update"],
  "region": "KE"
}
```

Comprehensive Role-Based Access Control (RBAC) Authorization Matrix				
Resource	Guest	Worker	Client	Admin
List Jobs	✅	✅	✅	✅
Create Job	✖	✖	✅	✅
Apply to Job	✖	✅	✖	✅
View Applications	✖	*Own*	*Own jobs*	✅
Process Payments	✖	✖	✅	✅
Manage Users	✖	✖	✖	✅

Privacy Compliance & Data Protection Excellence

High Sensitivity

AES-256 Encryption

- National ID numbers
- Financial account details
- Biometric data
- Full addresses

Medium Sensitivity

Hashed Storage

- Full names
- Email addresses
- Employment history
- Profile photos

Low Sensitivity

Standard Protection

- Professional skills
- Job preferences
- Public reviews
- Work availability

Strategic Additional Resources

Regional Compliance Coverage:
- **Kenya Data Protection Act:** Consent requirements, data localization, breach notification
- **Nigeria NDPR:** Privacy notices, data security measures, transfer restrictions
- **South Africa POPIA:** Information officers, processing limitations, cross-border transfers

Data Subject Rights Implementation:
- Right to access: `/users/{id}/data-export`
- Right to erasure: `/users/{id}/delete-account`
- Right to rectification: Standard PATCH endpoints
- Consent management: `/users/{id}/consent`

Security Measures:
- AES-256 encryption for PII at rest
- TLS 1.3 for data in transit
- Audit trails for all data access
- Automated breach detection and notification

Data Protection Implementation:

```python
# Encryption for sensitive data
encrypted_data = encrypt_aes_256(pii_data, encryption_key)

# Consent management
consent_record = {
    "user_id": user_id,
    "purposes": ["platform_operations", "analytics"],
    "timestamp": datetime.utcnow(),
    "version": CURRENT_CONSENT_VERSION
}
```

Market-Specific Adaptations

Localization Strategy

```
Language Support:
- English (default), Swahili, French, Arabic
- Accept-Language header: "sw-KE, sw;q=0.9, en;q=0.8"
- RTL support for Arabic regions

Regional Formatting:
- Currencies: KES, NGN, EGP, ZAR with proper symbols
- Dates: DD/MM/YYYY format for African markets
- Phone: E.164 with country-specific validation
```

Connectivity Optimization

```
Batch Operations:    POST /v1/batch (multiple operations)
Caching Strategy:    ETag, Cache-Control headers
Payload Optimization: Gzip compression, sparse fieldsets
Offline Capabilities: Sync queues, conflict resolution
```

Payment Integration

```
Mobile Money Support:
- M-Pesa (Kenya): STK Push integration
- Airtel Money (Multi-country): USSD integration
- Orange Money (West Africa): Direct charge

Bank Transfer Support:
- PesaLink (Kenya): Instant transfers
- NIBSS (Nigeria): Real-time payments

Security Features:
- Idempotency keys for duplicate prevention
- Webhook signature verification
- Transaction state management
```

Thank You