**Extended Complex Django Project Requirements**

**1. Core Backend (Django & Django Rest Framework)**

* **Django 4.x+ with DRF** (Django Rest Framework)
* **Multi-Tenancy Support** (e.g., Schema-based or Row-level multi-tenancy)
* **Advanced Authentication & Authorization**
  + JWT with refresh tokens
  + OAuth2 & Social Authentication (Google, Facebook, GitHub)
  + Role-Based & Attribute-Based Access Control (RBAC & ABAC)
  + Two-Factor Authentication (2FA) via OTP or Authenticator Apps
* **Database Design & Optimization**
  + PostgreSQL with Advanced Indexing (GIN, BRIN, etc.)
  + Partitioned Tables for Large Datasets
  + Database Replication & Sharding
* **Logging & Monitoring**
  + Centralized Logging (ELK Stack: Elasticsearch, Logstash, Kibana)
  + Application Performance Monitoring (APM) with Prometheus/Grafana
  + Distributed Tracing (OpenTelemetry or Jaeger)
* **Asynchronous Processing**
  + Celery with Redis/RabbitMQ for task queues
  + Periodic Scheduled Tasks using Celery Beat
  + WebSocket-based real-time notifications (Django Channels)
* **Caching & Performance Optimization**
  + Redis/Memcached for API response caching
  + Query Optimization & Read Replicas
  + Async Database Queries (Django + PostgreSQL Async Support)
* **Full-Text Search Engine**
  + Elasticsearch or OpenSearch integration
  + Advanced text search & autocomplete

**2. Frontend (Modern Web App)**

* **Framework Choices**: React.js, Vue.js, Angular with TypeScript
* **State Management**: Redux, Zustand (React), Pinia/Vuex (Vue), NgRx (Angular)
* **Dynamic Forms & Validation** (Formik, React Hook Form)
* **Progressive Web App (PWA) Support**
* **Real-time Updates**: WebSockets or Server-Sent Events (SSE)
* **SSR (Server-Side Rendering) & Static Site Generation (Next.js/Nuxt.js)**
* **Dark Mode & Theming Support**
* **Data Visualization**: Charts & Graphs (Chart.js, D3.js, Highcharts)

**3. Microservices Architecture & External Integrations**

* **Event-Driven Architecture**
  + Apache Kafka/RabbitMQ for Inter-Service Communication
  + Event Sourcing for Data Consistency
* **Authentication Microservice** (Custom or Using Keycloak/Auth0)
* **Payment & Billing System**
  + Stripe, PayPal, Razorpay Integration
  + Subscription Management with Django Stripe
  + Tax & Invoice Generation (PDF Auto-generation)
* **File Storage & Processing**
  + AWS S3 / Google Cloud Storage / MinIO Integration
  + Image Processing (Pillow, OpenCV)
  + Video Encoding (FFmpeg, AWS Elemental MediaConvert)
* **GraphQL API** with Strawberry or Graphene
* **Machine Learning & AI Integration (Optional)**
  + Predictive Analytics with Scikit-learn
  + Chatbot & NLP Features (OpenAI API, spaCy)
  + Computer Vision & Image Recognition (TensorFlow, OpenCV)

**4. Mobile App Integration (Optional)**

* **Cross-Platform Mobile App (React Native/Flutter)**
* **Offline-First Architecture (SQLite, AsyncStorage)**
* **Push Notifications (Firebase Cloud Messaging)**
* **Background Sync & Offline Data Handling**
* **Biometric Authentication (Face ID/Fingerprint)**

**5. DevOps, Security & CI/CD**

* **Infrastructure as Code (IaC)**
  + Terraform or Ansible for Infrastructure Automation
* **Containerization & Orchestration**
  + Docker & Docker Compose
  + Kubernetes (K8s) with Helm Charts
* **CI/CD Pipelines**
  + GitHub Actions, GitLab CI/CD, Jenkins
  + Automated Deployment to AWS/GCP/Azure
* **Security Hardening**
  + OWASP Security Practices
  + API Rate Limiting & Throttling
  + SSL/TLS Encryption (Let's Encrypt)
  + Secure Headers & CSP Policies
  + Dependency Scanning (Snyk, Bandit)
* **Observability & Performance Monitoring**
  + Prometheus + Grafana for Metrics
  + Distributed Logging (Fluentd, Loki)
  + Alerting via Slack/Webhooks

**6. Additional Advanced Features**

* **Multi-Language & Multi-Currency Support**
* **Multi-Tenant SaaS Capability**
* **User Behavior Analytics (Heatmaps, Session Recording)**
* **AI-powered Recommendations (Personalized Content)**
* **Blockchain Integration (Optional)**
* **IoT Data Processing (MQTT Integration, Edge Computing)**