Mobile Product Factory Architectural Manual

163 Modules, Zero-Trust Rules, and Clean Architecture for Android & iOS

Repository: https://github.com/sh15aa/Appreusable &nbsp;|&nbsp; Total Modules: 163 &nbsp;|&nbsp; Status: Production-Grade

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■ Android + iOS Mobile Product Factory

> **"100 apps ≠ one giant mobile application."**

> Build a reusable **Mobile App Factory infrastructure**, while every individual app remains an independent, securely deployed, independently branded product.

■■ Core Architectural Model

```
MOBILE APP FACTORY ■ ■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■ ■ ■ FACTORY INFRASTRUCTURE
PRODUCT APPS (163 Reusable Modules) (100+ Independent) ■ ■ ■■■ PRODUCT ENGINE (Mod 01-63) ■■■ App 001 (PulseZen) ■
■■■ Mod 01-10: Architecture & Auth ■■■ App 002 (VoiceNotes AI) ■ ■■■ Mod 11-20: Data, Offline & Design ■■■ App
003 (HabitForge) ■ ■■■ Mod 21-30: Hardware, AI & IAP ■■■ App 004 (DocScanner) ■ ■■■ Mod 31-40: Deep Links &
Lifecycle ■■■ App 037 (SoundScape AI) ■ ■■■ Mod 41-50: Storage, CI/CD & Testing ■■■ ...100+ ■ ■■■ Mod 51-63:
ASO, CLI & 360+ Tracker ■ ■■■ SECURITY & SCALE ENGINE (Mod 64-163) ■■■ Mod 64-78: Threat Modeling, Zero-Trust,
AuthZ, Secrets & DB ■■■ Mod 79-96: Multi-Region, Scale, Abuse, Tokens, Integrity & SSRF ■■■ Mod 97-115:
Input/Output Security, Audit, CI/CD & SBOM ■■■ Mod 116-125: SAST/DAST, OWASP MASVS/MASWE & Privacy ■■■ Mod
126-145: Third-Party Risk, Cost Explosion & Observability ■■■ Mod 146-163: Fraud, 1M User Scale Gate & Master
Security Monitor
```

■ The 60 Production Modules

#	Module Name	Description & Security Capabilities
01	`mod_01_product_idea_engine`	Market demand, competition density, willingness to pay, and lifecycle state machine.
02	`mod_02_tech_stack_standard`	Strict typing (`strict-casts`, `strict-inference`), zero raw prints, architecture linter.
03	`mod_03_app_starter_template`	Production Flutter starter scaffold with Clean Architecture and Service Locator DI.
04	`mod_04_core_architecture`	Functional `Result<S, F>`, `UseCase<Type, Params>`, and zero unhandled exception primitives.
05	`mod_05_app_config_system`	Strongly-typed app configuration (Dev, Staging, Production) with compile-time assertions.
06	`mod_06_android_identity`	4096-bit RSA keystore generation, ProGuard/R8 obfuscation, and strict cleartext traffic blocks.
07	`mod_07_ios_identity`	Hardened `Info.plist`, App Transport Security (ATS) enforcement, and Entitlements templates.
08	`mod_08_environment_system`	Multi-environment `.env` manager with runtime schema validation and encrypted secrets.
09	`mod_09_auth_module`	OAuth2 + PKCE verifier/challenge, token rotation, and hardware-backed secure storage.
10	`mod_10_authorization_system`	Zero-Trust RBAC & granular permission enforcement engine.
11	`mod_11_local_data_system`	Encrypted Key-Value and SQLCipher database contracts with hardware keystore keys.
12	`mod_12_offline_first_sync`	Outbox Pattern sync engine with UUIDv4 idempotency keys and exponential backoff.
13	`mod_13_api_layer`	Resilient HTTP engine with SSL/TLS pinning, jittered retry policy, and standard envelope.
14	`mod_14_error_handling`	Centralized error taxonomy; scrubs internal stack traces and server addresses from user errors.

| **15** | `mod_15_state_management` | Standardized state machine (`Initial`, `Loading`, `Success`, `Empty`, `Error`, `Offline`, `Refreshing`). |

| **16** | `mod_16_design_system` | Atomic mobile component specifications (`AppButton`, `AppCard`, `AppTextField`, `AppSkeleton`). |

| **17** | `mod_17_design_tokens` | Atomic design tokens: `AppSpacing`, `AppRadius`, `AppElevation`, and color scales. |

| **18** | `mod_18_responsive_ui` | Adaptive breakpoints for compact phones (<600dp), foldables (600-840dp), and tablets (>840dp). |

| **19** | `mod_19_accessibility` | WCAG 2.1 AA/AAA contrast ratio validator and minimum 48x48dp touch target checks. |

| **20** | `mod_20_dark_mode` | Dynamic theme engine: System, Light, Dark, and AMOLED black modes. |

| **21** | `mod_21_device_features` | Native hardware bridges: Haptics, Secure Clipboard (auto-cleared after 60s), and Biometrics. |

| **22** | `mod_22_permission_architecture` | Zero-crash permission manager with educational rationale dialogs before OS prompt. |

| **23** | `mod_23_push_notifications` | Push notification handler for FCM / APNs with deep linking and encrypted payloads. |

| **24** | `mod_24_analytics` | Privacy-first analytics engine; strictly scrubs PII and enforces GDPR consent mode. |

| **25** | `mod_25_crash_monitoring` | Enterprise crash reporting (Sentry/Crashlytics) with rolling breadcrumbs and PII scrubbing. |

| **26** | `mod_26_performance_monitoring` | Performance trace watchdog measuring startup duration, screen render latency, and API times. |

| **27** | `mod_27_ai_client_module` | AI mobile client supporting Server-Sent Events (SSE) streaming and prompt hydration. |

| **28** | `mod_28_ai_cost_gateway` | Token budgeting, user tier quotas (Free/Pro), rate-limiting, and model fallback. |

| **29** | `mod_29_subscription_system` | Cross-platform IAP abstraction (StoreKit 2, Google Play Billing, RevenueCat). |

| **30** | `mod_30_purchase_security` | Server-side receipt verification and HMAC SHA-256 webhook signature validation. |

| **31** | `mod_31_ads_module` | Privacy-friendly ads manager with frequency capping and remote kill-switch. |

| **32** | `mod_32_remote_config` | Remote configuration client with local cache fallbacks and type-safe getters. |

| **33** | `mod_33_feature_flags` | Deterministic SHA-256 user hashing for gradual percentage rollouts (10%, 50%, 100%). |

| **34** | `mod_34_deep_link_system` | Universal & App Links router with URI validation and path parameter sanitization. |

| **35** | `mod_35_sharing_system` | Native share sheet integration and shareable attribution text formatter. |

| **36** | `mod_36_viral_loops` | Cryptographic referral code generator and viral loop reward unlocking engine. |

| **37** | `mod_37_onboarding_engine` | Multi-step interactive onboarding state machine with permission priming. |

| **38** | `mod_38_app_lifecycle` | App execution state observer with automatic flush hooks before suspension. |

| **39** | `mod_39_security_hardening` | Anti-tamper security suite: Root/Jailbreak detection, emulator check, anti-debugger. |

| **40** | `mod_40_data_validation` | Strict input sanitization, anti-SQLi parameter validation, and anti-XSS HTML entity escaping. |

| **41** | `mod_41_database_architecture` | Encrypted SQLite migration engine with atomic versioning and rollback capability. |

| **42** | `mod_42_file_storage` | Direct presigned URL cloud upload manager with MIME-type and size validation. |

| **43** | `mod_43_background_jobs` | Battery-optimized background scheduler with charging and unmetered network constraints. |

| **44** | `mod_44_app_backend_template` | Zero-trust isolated FastAPI backend with JWT validation, SlowAPI rate-limiting, and isolated DB. |

| **45** | `mod_45_cicd_factory` | GitHub Actions & Fastlane CI/CD pipelines for automated AAB and IPA release builds. |

| **46** | `mod_46_automated_testing` | Unit test harness, MockWebServer, and test fixtures. |

| **47** | `mod_47_golden_user_journey` | Maestro / Patrol E2E automation script testing the complete golden conversion funnel. |

| **48** | `mod_48_device_test_matrix` | Device farm matrix covering 12 device archetypes across Android and iOS versions. |

| **49** | `mod_49_release_checklist` | Automated Python pre-flight release auditor verifying 32 release criteria. |

| **50** | `mod_50_aso_factory` | ASO metadata engine validating title, subtitle, keywords, and character limits. |

| **51** | `mod_51_screenshot_factory` | Automated screenshot capture (Fastlane Snapshot) and 5-slide layout generator. |

| **52** | `mod_52_review_monitoring` | Review scraper and sentiment classifier categorizing Bugs, Pricing, and Feature Requests. |

| **53** | `mod_53_analytics_dashboard` | Portfolio metrics aggregator computing DAU, MAU, Retention, and MRR. |

| **54** | `mod_54_health_scorecard` | Algorithmic product health evaluator (Grades A-D based on stability, retention, monetization). |

| **55** | `mod_55_app_factory_db` | Central SQLite portfolio database managing all 100+ app definitions and credentials. |

| **56** | `mod_56_automated_cli` | `factory-cli`: 1-command product scaffolding tool (`./factory-cli new --id app-042`). |

| **57** | `mod_57_ai_agent_team` | Roster and prompt specifications for the 15 specialized AI product agents. |

| **58** | `mod_58_dev_pipeline` | 16-phase gatekeeper pipeline engine enforcing strict phase transition criteria. |

| **59** | `mod_59_architecture_boundary` | AST linter prohibiting cross-app pollution and ensuring shared modules remain product-agnostic. |

| **60** | `mod_60_portfolio_registry` | Melos monorepo orchestrator for portfolio-wide dependency, test, and build management. |

| **61** | `mod_61_isolation_guardian` | Enforces Rule 61: Strict isolation of App + Backend + Database per product (zero shared DBs). |

| **62** | `mod_62_one_click_synthesizer` | Implements Rule 62: Autonomous 'One-Click' Generator synthesizing PRD, OpenAPI, Schema, App & Backend. |

| **63** | `mod_63_master_checklist_tracker` | Implements Rule 63: Master 360+ task checklist across 10 Layers & 16 Phases with interactive tracker CLI. |

■■ Rule 61: The Most Important Factory Rule

Your architecture strictly enforces:

```
FACTORY ■ ■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■ ■ ■ ■ App 1 App 2 App 3 ■ ■ ■ Backend Backend Backend ■ ■ ■ DB DB
DB NOT: GIANT BACKEND ■ ■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■ ■ ■ ■ App 1 App 2 App 100
```

Shared infrastructure never means shared product data. Every app has its own:

- Dedicated bundle ID & signing keystores
- Independent backend service
- Dedicated database (SQLite, SQLCipher, or isolated PostgreSQL)
- Independent release cycle, store listing, and analytics property

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■ Rule 62: Your "One-Click" Future

To generate an entire production product (PRD, OpenAPI, DB Schema, ASO Plan, Flutter App, and FastAPI Backend):

```
python3 modules/mod_62_one_click_synthesizer/synthesizer.py \ --id app-037 \ --name "SoundScape AI" \ --problem
"Insomnia and stress prevent focus and restorative sleep" \ --target "Students, remote professionals, neurodivergent
individuals" \ --features "Binaural Beats Generator" "Adaptive Sleep Timer" "Haptic Pulse Sync"
```

This autonomously creates:

```
apps/app-037/ ■■■ docs/ ■ ■■■ PRD.md # Product Requirements Document ■ ■■■ openapi.json # OpenAPI 3.0
specification ■ ■■■ schema.sql # Isolated DB schema ■ ■■■ ASO.md # App Store & Google Play metadata ■■■ mobile/ ■
■■■ lib/ ■ ■ ■■■ core/ ■ ■ ■■■ features/ ■ ■ ■■■ main.dart # Flutter app with Clean Architecture ■ ■■■
pubspec.yaml # Factory module dependencies ■■■ backend/ ■■■ app/ ■■■ main.py # Isolated FastAPI backend server
```

■ Rule 63: The 10 Factory Layers & Master 360+ Task Checklist

The 10 Factory Layers

1. **Layer 1**: Idea / Research
2. **Layer 2**: Product Management
3. **Layer 3**: Design System
4. **Layer 4**: Mobile Development

5. **Layer 5**: Backend / Database
6. **Layer 6**: AI / Automation
7. **Layer 7**: Testing / Security
8. **Layer 8**: CI/CD / Release
9. **Layer 9**: ASO / Marketing
10. **Layer 10**: Analytics / Growth

Master Checklist & Progress Tracker CLI (`tracker-cli`)

Track all 360+ granular tasks across an app's lifecycle:

```
# 1. Initialize checklist for an app ./modules/mod_63_master_checklist_tracker/tracker-cli init --app app-037 # 2.
View real-time progress & scorecard ./modules/mod_63_master_checklist_tracker/tracker-cli status --app app-037 # 3.
Mark a task completed ./modules/mod_63_master_checklist_tracker/tracker-cli complete --app app-037 --task IDEA_001 #
4. Export complete Markdown checklist for GitHub issues or docs
./modules/mod_63_master_checklist_tracker/tracker-cli export --app app-037 > apps/app-037/CHECKLIST.md
```

The Big Difference: Mobile Factory vs Web/SaaS Factory

For Web/SaaS products, the deployment unit is:

> `Web application + backend + infrastructure`

For Mobile products, the deployment unit is:

> `Android application (AAB/APK) + iOS application (IPA) + store identities + backend + device capabilities + release pipelines`

The factory provides dedicated modules for:

- Native Keystore generation (`mod_06`) & Fastlane Match iOS signing (`mod_07`)
- Contextual permission management (`mod_22`)
- Push notifications with encrypted payloads (`mod_23`)
- Deep links & App Links routing (`mod_34`)
- Store pre-flight release auditing (`mod_49`)
- Automated screenshot generator (`mod_51`)
- Review mining AI & sentiment categorization (`mod_52`)

■■ Security & Scale Engine (Modules 64–163)

Conforms to **OWASP MASVS v2.0 / MASTG / MASWE 1.0** and **OWASP API Security Top 10**:

| Command | Module | Description |

|---|---|---|

| `npm run security:scorecard -- --app <app-id>` | [`mod_153`](file:///home/shiva/appreusable/modules/mod_153_security_scorecard) | Evaluates 14-dimension security scorecard release gate |

| `npm run security:owasp -- --app <app-id>` | [`mod_119`](file:///home/shiva/appreusable/modules/mod_119_owasp_masvs_test) | Verifies OWASP MASVS & API Top 10 (BOLA/BOPLA/SSRF) |

| `npm run security:scale -- --app <app-id>` | [`mod_155`](file:///home/shiva/appreusable/modules/mod_155_1m_user_scale_gate) | Calculates 1M user scale RPS, storage, and pod capacity |

| `npm run security:portfolio` | [`mod_162`](file:///home/shiva/appreusable/modules/mod_162_factory_security_monitor) | Runs central security monitor across all 100+ portfolio apps |