Shadow AI - Universal Development Agent

Complete Documentation & Capabilities Guide

Version: 3.0.0
Total Services: 180
Build Status: ✅ Passing
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Overview

Shadow AI is an Electron-based universal development agent powered by advanced AI models. It provides comprehensive code generation, development assistance, and autonomous workflow capabilities across **180 specialized services** covering game development and full-stack web/mobile/desktop development.

Key Features

- **AI-Powered Code Generation**: Leverages multiple AI models (OpenAI, Anthropic, Google, Kimi K2) with intelligent routing
- **180 Specialized Services**: Code generators for every development domain
- **900+ IPC Handlers**: Seamless main/renderer process communication
- **Autonomous Workflows**: Self-executing development pipelines
- **Multi-Engine Game Development**: Support for 10+ game engines and 15+ genres
- **Enterprise Patterns**: Multi-tenancy, CQRS, Event Sourcing, RBAC/ABAC
- **Modern Architecture**: Clean, Hexagonal, DDD patterns built-in

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Architecture

Technology Stack

Layer	Technology
Runtime	Electron 28+
Frontend	React 18, TypeScript, Vite
Backend	Node.js, TypeScript
AI Models	OpenAI GPT-4, Claude 3.5, Gemini, Kimi K2
State	Zustand
IPC	Electron IPC (1200+ handlers)

Directory Structure

```
shadow-ai/
├── src/
│   ├── main/                  # Electron main process
│   │   ├── ai/                # AI routing, memory, agents
│   │   │   ├── routing/       # Model selection & fallback
│   │   │   ├── memory/        # Vector store & context
│   │   │   └── terminal/      # Terminal agent
│   │   ├── ipc/               # IPC handlers (1200+)
│   │   │   ├── fileHandlers.ts
│   │   │   ├── whisperHandlers.ts
│   │   │   ├── kimiK2Handlers.ts  # 900+ service handlers
│   │   │   └── ...
│   │   └── services/          # 180 code generation services
│   │       ├── game/          # 89 game services
│   │       └── *.ts           # 91 full-stack services
│   └── renderer/              # React frontend
│       ├── components/
│       └── hooks/
├── package.json
└── electron.vite.config.ts
```

Game Development Services

89 Specialized Game Development Services

Game Engines (10+ supported)

Engine	Service	Capabilities
Unity	`UnityProjectGenerator`	C# scripts, prefabs, ScriptableObjects, ECS
Unreal	`UnrealProjectGenerator`	Blueprints, C++, materials, actors
Godot	`GodotProjectGenerator`	GDScript, nodes, scenes, signals
Phaser	`PhaserGenerator`	TypeScript, scenes, physics
PixiJS	`PixiJSGenerator`	WebGL rendering, sprites, filters
Three.js	`ThreeJSGenerator`	3D scenes, materials, animations
Babylon.js	`BabylonGenerator`	3D worlds, physics, XR
PlayCanvas	`PlayCanvasGenerator`	Browser 3D, components
Cocos	`CocosGenerator`	2D/3D mobile games
RPG Maker	`RPGMakerGenerator`	Events, plugins, maps

Game Genres (15+ supported)

Genre	Service	Features
Platformer	`PlatformerGenerator`	Physics, tile maps, abilities

RPG	`RPGGenerator`	Stats, inventory, quests, dialogue
FPS	`FPSGenerator`	Weapons, aiming, multiplayer
RTS	`RTSGenerator`	Units, buildings, AI, fog of war
Racing	`RacingGenerator`	Vehicles, tracks, AI racers
Puzzle	`PuzzleGenerator`	Match-3, physics puzzles
Survival	`SurvivalGenerator`	Crafting, hunger, base building
Tower Defense	`TowerDefenseGenerator`	Towers, waves, upgrades
Roguelike	`RoguelikeGenerator`	Procedural gen, permadeath
Fighting	`FightingGenerator`	Combos, hitboxes, frame data
Horror	`HorrorGenerator`	Atmosphere, scares, sanity
Sports	`SportsGenerator`	Physics, teams, seasons
Simulation	`SimulationGenerator`	Economy, AI citizens
Card Game	`CardGameGenerator`	Decks, hands, effects
Visual Novel	`VisualNovelGenerator`	Dialogue trees, branching

Core Game Systems (20+)

System	Service	Capabilities
Physics	`PhysicsSystemGenerator`	2D/3D physics, collisions, raycasting
AI/Pathfinding	`AISystemGenerator`	A*, behavior trees, steering
Networking	`MultiplayerGenerator`	P2P, client-server, sync
Audio	`AudioSystemGenerator`	3D audio, music, SFX
Particles	`ParticleSystemGenerator`	Emitters, effects
Animation	`AnimationSystemGenerator`	State machines, blending
UI/HUD	`GameUIGenerator`	Health bars, menus, inventory
Save System	`SaveSystemGenerator`	Local, cloud saves
Dialogue	`DialogueSystemGenerator`	Trees, localization
Quest	`QuestSystemGenerator`	Objectives, rewards
Inventory	`InventorySystemGenerator`	Items, stacking, equipment
Combat	`CombatSystemGenerator`	Turn-based, real-time
Crafting	`CraftingSystemGenerator`	Recipes, materials
Economy	`EconomySystemGenerator`	Currency, trading, shops
Weather	`WeatherSystemGenerator`	Day/night, rain, seasons
Terrain	`TerrainGenerator`	Procedural, heightmaps

Character	`CharacterCreatorGenerator`	Customization, presets
Achievements	`AchievementSystemGenerator`	Unlocks, progress
Leaderboards	`LeaderboardGenerator`	Online rankings
Input	`InputSystemGenerator`	Keyboard, gamepad, touch

Full-Stack Development Services

91 Specialized Full-Stack Services

Backend Frameworks

Service	Technologies	Capabilities
`ExpressGenerator`	Express.js	REST APIs, middleware, routing
`FastifyGenerator`	Fastify	High-performance APIs, plugins
`NestJSGenerator`	NestJS	Decorators, modules, DI
`GraphQLGenerator`	Apollo, GraphQL	Queries, mutations, subscriptions
`GraphQLTooling`	CodeGen, Federation	Type generation, microservices
`TRPCGenerator`	tRPC	Type-safe APIs, React Query

Frontend Frameworks

Service	Technologies	Capabilities
`ReactGenerator`	React 18	Hooks, context, Suspense
`NextJSGenerator`	Next.js 14	App Router, RSC, SSR/SSG
`RemixGenerator`	Remix	Loaders, actions, forms
`VueGenerator`	Vue 3	Composition API, Pinia
`SvelteGenerator`	SvelteKit	Stores, load functions
`AngularGenerator`	Angular 17	Signals, standalone
`SSGGenerator`	Astro, 11ty	Static sites, islands
`MicroFrontends`	Module Federation	Remote modules, shared state

State Management

Service	Technologies
`StateGenerator`	Redux Toolkit, Zustand, MobX, Jotai

Mobile Development

Service	Technologies	Capabilities

`ReactNativeGenerator`	React Native	Native modules, navigation
`FlutterGenerator`	Flutter/Dart	Widgets, state management

Desktop Development

Service	Technologies	Capabilities
`ElectronGenerator`	Electron	IPC, system integration
`TauriGenerator`	Tauri/Rust	Lightweight, secure

Runtime Alternatives

Service	Technologies	Capabilities
`DenoPatterns`	Deno, Fresh, Oak	Modern runtime, native APIs

Database & ORM

Service	Technologies	Capabilities
`ORMGenerator`	Prisma, Drizzle, TypeORM	Schemas, migrations
`SQLGenerator`	PostgreSQL, MySQL	Raw queries, optimization
`NoSQLGenerator`	MongoDB, DynamoDB	Documents, aggregations
`RedisPatterns`	Redis	Caching, pub/sub, sessions
`DataSeeder`	Faker	Realistic test data
`DataExporter`	CSV, Excel, ZIP	Data export utilities

Authentication & Authorization

Service	Technologies	Capabilities
`AuthGenerator`	NextAuth, Lucia, Clerk	OAuth, magic links, sessions
`AuthorizationPatterns`	CASL, RBAC, ABAC	Permissions, policies

API Infrastructure

Service	Technologies	Capabilities
`APIGateway`	Kong, AWS API Gateway	Rate limiting, auth
`OpenAPIGenerator`	Swagger, OpenAPI 3.1	Specs, documentation
`CachingStrategies`	Redis, CDN	Cache patterns, invalidation

Real-time & Messaging

Service	Technologies	Capabilities
`WebSocketGenerator`	Socket.io, WS	Real-time communication
`QueueGenerator`	BullMQ, RabbitMQ	Job queues, workers

WebhookHandler	Webhooks	Receiving, verification, retry

Cloud & Infrastructure

Service	Technologies	Capabilities
DockerGenerator	Docker, Compose	Containers, multi-stage
KubernetesGenerator	K8s	Deployments, services, ingress
ServerlessGenerator	AWS Lambda	Functions, triggers
ServerlessFramework	SST, Serverless	Full-stack serverless
TerraformGenerator	Terraform	AWS/GCP/Azure IaC
MonorepoGenerator	Turborepo, Nx	Workspace management
EdgeFunctionsGenerator	Cloudflare, Vercel	Edge computing
ServiceMesh	Istio	Traffic routing, mTLS
DeploymentStrategies	Blue/Green, Canary	Zero-downtime deploys

Enterprise Patterns

Service	Technologies	Capabilities
MultiTenancyPatterns	Row-level, Schema	SaaS architectures
EventSourcingGenerator	CQRS, Event Store	Aggregates, projections
SchedulerGenerator	node-cron, Agenda	Job scheduling
MicroservicesPatterns	Saga, Circuit Breaker	Distributed patterns
ArchitecturePatterns	Clean, Hexagonal, DDD	Architecture templates

Testing

Service	Technologies	Capabilities
TestGenerator	Jest, Vitest, Mocha	Unit tests
E2ETestGenerator	Playwright, Cypress	End-to-end tests
APIMockingGenerator	MSW	API mocking
LoadTestingGenerator	k6, Artillery	Performance tests
ContractTestingGenerator	Pact	Consumer-driven contracts
VisualRegressionTesting	Percy, Chromatic	Screenshot comparison
ChaosEngineering	Fault injection	Resilience testing

Observability

Service	Technologies	Capabilities
LoggingGenerator	Pino, Winston	Structured logging

`MonitoringGenerator`	Prometheus, Grafana	Metrics, dashboards
`DistributedTracing`	OpenTelemetry, Jaeger	Request tracing
`ErrorTrackingGenerator`	Sentry	Error reporting

Forms & Validation

Service	Technologies	Capabilities
`FormBuilder`	React Hook Form, Formik	Form state, submission
`ValidationGenerator`	Zod, Yup, Joi	Schema validation

File Handling

Service	Technologies	Capabilities
`FileUploadGenerator`	S3, Cloudinary	Upload, storage
`MediaProcessor`	Sharp, FFmpeg	Image/video processing
`PDFGenerator`	Puppeteer	PDF generation

Search

Service	Technologies	Capabilities
`SearchGenerator`	Elasticsearch, Algolia, Meilisearch	Full-text search

Notifications

Service	Technologies	Capabilities
`NotificationServiceGenerator`	FCM, APNs, Email	Push notifications

Analytics

Service	Technologies	Capabilities
`AnalyticsGenerator`	GA4, Mixpanel	Event tracking

Performance

Service	Technologies	Capabilities
`PerformanceOptimizer`	Web Vitals	Core Web Vitals optimization

PWA & Web3

Service	Technologies	Capabilities
`PWAGenerator`	Service Workers	Offline support, install
`Web3Generator`	Wagmi, ethers.js	Wallet connection
`SmartContractGenerator`	Solidity, Hardhat	ERC20/721 contracts

WASMGenerator	Rust, WebAssembly	High-performance code

Extensions & Bots

Service	Technologies	Capabilities
BrowserExtensionGenerator	Manifest V3	Chrome/Firefox extensions
VSCodeExtensionGenerator	VS Code API	Editor extensions
BotGenerator	Discord.js, Slack, Telegram	Chat bots

CLI Tools

Service	Technologies	Capabilities
CLIGenerator	Commander, Inquirer	CLI applications

Documentation

Service	Technologies	Capabilities
DocSiteGenerator	Docusaurus, VitePress	Documentation sites
StorybookGenerator	Storybook	Component documentation

Security

Service	Technologies	Capabilities
SecurityPatterns	CORS, CSRF, Rate Limit	Security middleware

UI/UX

Service	Technologies	Capabilities
SEOGenerator	Meta tags, sitemap	Search optimization
AccessibilityChecker	WCAG, aria	a11y compliance
DesignSystemGenerator	CSS variables	Design tokens
I18nGenerator	i18next, Intl	Internationalization

Payments & CMS

Service	Technologies	Capabilities
PaymentGenerator	Stripe, PayPal	Checkout, subscriptions
CMSIntegration	Strapi, Sanity, Contentful	Headless CMS

Feature Management

Service	Technologies	Capabilities
FeatureFlagGenerator	LaunchDarkly	Feature toggles

AI & ML

Service	Technologies	Capabilities
`LLMIntegration`	OpenAI, Anthropic	AI integration
`RAGGenerator`	Vector stores, embeddings	RAG pipelines
`MLPipelineGenerator`	MLflow, BentoML	ML Ops
`ETLPipelineGenerator`	Streams	Data pipelines

Publishing

Service	Technologies	Capabilities
`PackagePublishing`	npm, PyPI	Package distribution

Complete Service Catalog

Summary Statistics

Metric	Value
Total Services	180
Game Development	89
Full-Stack Development	91
IPC Handlers	900+
Lines of Code	~200,000+

Areas for Improvement

While the Shadow AI agent is extremely comprehensive, here are potential areas you could explore for enhancement:

1. Additional Language Support

- **Go** backend patterns (Gin, Fiber, Echo)
- **Rust** web frameworks (Actix, Axum)
- **Python** web frameworks (FastAPI, Django REST)
- **Ruby on Rails** patterns
- **Java/Kotlin** Spring Boot patterns

2. Additional Game Engines

- **Defold** (Lua-based engine)
- **MonoGame** (C# framework)
- **Bevy** (Rust ECS engine)
- **Love2D** (Lua 2D framework)

3. More Cloud Providers

- **DigitalOcean** App Platform patterns

- **Fly.io** deployment patterns
- **Railway** configurations
- **Render** setups

4. Additional Database Support

- **CockroachDB** patterns
- **TiDB** configurations
- **ScyllaDB** patterns
- **Neo4j** graph database

5. More Testing Tools

- **Vitest UI** configurations
- **Testing Library** patterns
- **Detox** React Native E2E
- **Maestro** mobile testing

6. DevSecOps

- **SAST** scanner integration
- **DAST** patterns
- **Dependency scanning** (Snyk, Dependabot)
- **Secret scanning** patterns

7. UI Enhancement

- **Agent workflow visualization** improvements
- **Real-time code preview**
- **Drag-and-drop component builder**
- **Visual architecture designer**

8. AI Improvements

- **Custom model fine-tuning** interface
- **Multi-modal support** (images, diagrams)
- **Code review suggestions**
- **Automated documentation generation**

Conclusion

Shadow AI is a comprehensive universal development agent with 180 specialized services covering:

- ✅ 10+ game engines
- ✅ 15+ game genres
- ✅ 20+ core game systems
- ✅ All major frontend frameworks
- ✅ All major backend patterns
- ✅ Mobile (React Native, Flutter)
- ✅ Desktop (Electron, Tauri)
- ✅ Cloud & DevOps (Docker, K8s, Terraform, Serverless)
- ✅ Enterprise patterns (CQRS, Event Sourcing, Multi-tenancy)
- ✅ Testing (Unit, E2E, Load, Contract, Visual, Chaos)
- ✅ Observability (Tracing, Logging, Monitoring)
- ✅ Security, Authentication, Authorization
- ✅ AI/ML integration

- ✅ And much more...

The agent represents a truly exhaustive development toolkit.

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