Spring Framework vs Python Ecosystem Cheat Sheet

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| Purpose / Layer | Java - Spring Ecosystem | Python Equivalent / Ecosystem |
| Web Framework | Spring MVC, Spring Boot | Django, FastAPI, Flask, Tornado |
| REST APIs | Spring Web / WebFlux | FastAPI, Django REST Framework, Flask-RESTX |
| Dependency Injection | Spring Core / Context | Dependency Injector, Wired, Injector |
| ORM / Database Access | Hibernate, Spring Data JPA | Django ORM, SQLAlchemy, Tortoise ORM, Peewee |
| Configuration Management | application.yml / @Value | Pydantic Settings, Dynaconf, python-dotenv |
| Validation | Hibernate Validator (JSR-380) | Pydantic, marshmallow, Cerberus |
| Authentication / Security | Spring Security | Authlib, Django Auth, FastAPI Security, OAuthlib |
| Background Jobs | Spring Scheduler, Quartz | Celery, APScheduler, Django-Q, Huey |
| Message Queue | Spring Kafka, Spring AMQP | Celery, aiokafka, kombu, dramatiq |
| API Documentation | SpringDoc OpenAPI | FastAPI (auto), drf-yasg, Flask-Swagger-UI |
| Reactive Programming | Spring WebFlux | FastAPI (async), Starlette, Trio |
| SSO / OAuth | Spring Security OAuth2 | Authlib, OAuthlib, python-social-auth |
| Admin Panel | Spring Boot Admin | Django Admin, Flask-Admin, Jet Admin |
| Unit Testing | JUnit, Mockito | pytest, unittest, nose2 |
| Integration Testing | Spring Test, MockMvc | pytest + TestClient, FactoryBoy |
| Monitoring | Spring Boot Actuator | Prometheus, Sentry, NewRelic |
| Logging | Logback, SLF4J | structlog, loguru, sentry-sdk |
| Migrations | Flyway, Liquibase | Alembic, Django Migrations, Yoyo |
| Service Discovery | Spring Cloud + Eureka | Consul, etcd, Zookeeper, Py-Eureka-Client |
| API Gateway | Spring Cloud Gateway | Kong, Traefik, NGINX |
| Containerization | Spring + Docker | Docker + uvicorn/gunicorn |
| Kubernetes | Spring Cloud Kubernetes | Helm, k8s-client, FastAPI K8s |
| Feature Flags | Unleash, FF4J | Unleash-client, Flipper, flagsmith-python |
| Internationalization | Spring i18n | Babel, gettext, django-i18n |
| Event-Driven Architecture | Spring Cloud Stream | Faust, Celery Events, Nameko |
| GraphQL Support | Spring GraphQL | Strawberry, Graphene, Ariadne |
| File Upload/Download | MultipartResolver | FastAPI UploadFile, Django FileField |
| WebSockets | Spring WebSocket | FastAPI WebSockets, Django Channels, Socket.IO |
| Rate Limiting | Spring Cloud Gateway RateLimiter | slowapi (FastAPI), Django Ratelimit |
| API Versioning | Spring API Versioning | FastAPI versioning, DRF versioning |
| Static File Hosting | Spring ResourceHandler | FastAPI StaticFiles, Django staticfiles |
| Template Engines | Thymeleaf, JSP | Jinja2 (Flask/FastAPI), Django Templates |
| Form Handling | Spring Forms | Django Forms, WTForms (Flask) |
| Graph Databases | Spring Data Neo4j | Py2neo, neomodel |
| MongoDB Integration | Spring Data MongoDB | MongoEngine, Motor (async), Djongo |
| Cloud Functions | Spring Cloud Function | AWS Lambda (Python), Zappa, Chalice |
| Dev Tools / Hot Reload | Spring DevTools | uvicorn --reload, Django runserver |
| Metrics & Tracing | Micrometer + Prometheus | Prometheus-client, OpenTelemetry, StatsD |
| Circuit Breaker | Resilience4j | PyBreaker, Tenacity |
| Database Pooling | HikariCP | SQLAlchemy pooling, Django db pool (external libs) |
| Session Management | Spring Session | Django Sessions, Flask-Session |
| Multi-tenancy Support | Spring Multi-tenancy | Django Tenant Schemas, FastAPI custom middlewares |
| Code Generation / Scaffolding | Spring Initializr | Django Startproject, Cookiecutter, FastAPI CLI |
| Package Management | Maven, Gradle | pip, poetry, pipenv |

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