What's New in Spring

2023/2024 edition

Spencer Gibb

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Tweet by James Smith from NounProject.com
Mastodon by Icon 54 from iconscout.com

Agenda

- History
- JDK 21
- Performance
- New Clients
- Testing
- New Projects
- Roadmap
- Q+A

Man coding and using three computers by Scopio from Noun Project (CC BY-NC-ND 2.0)

History

History by monkik from NounProject.com

Spring Framework and Friends History

Spring Framework Releases

- 1.0 - 24 March 2004
- 5.0 - 28 September 2017
- 6.0 - 16 November 2022
- 6.1 - 16 November 2023

Spring Cloud Releases

- Angel - 03 March 2015
- Finchley - 18 June 2018
- 2022.0 Dec ‘22 / 2023.0 Dec ‘23

Spring Boot Releases

- 1.0 - 1 April 2014
- 2.0 - 1 March 2018
- 3.0 - 24 November 2022
- 3.1 May 2023 / 3.2 November 2023

What versions are compatible?

https://start.spring.io

spring

Previous Release Highlights

Java 17 Baseline

- New Language, Library & JVM Features
- https://advancedweb.hu/new-language-features-since-java-8-to-17/

Jakarta EE 9

- javax.* ➩ jakarta.*
- Container updates (Tomcat, Jetty, etc...)

Declarative Clients

- OpenFeign ➩ Spring Framework
- HTTP and RSocket

GraalVM Native / AOT

- Static binary, no JVM needed
- Startup and memory advantages
- Closed world assumptions and other tradeoffs

Observability

- Spring Cloud Sleuth ➩ Micrometer
- Full stack tracing & metrics
- Observation API

Jonatan Ivanov

Observability for Modern JVM Applications

Fri Feb 23 @ 13:00

ST-Laurent 7 (English)

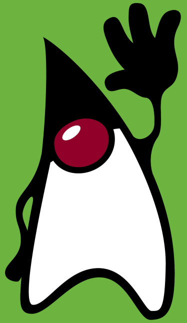
spring®

Dan Vega

Spring Boot 3 & Beyond!

Wed Feb 21 @ 14:00

Westmount 6 (English)



JDK 21 and Beyond

JDK 17 & 21

JDK 17 - Sep 2021

- LTS
- Minimum JDK Baseline for:
  - Spring Framework 6.x
  - Spring Boot 3.x
  - Spring Cloud 2021.0+

JDK 21 - Sep 2023

- LTS
- Supported by:
  - Spring Framework 6.1+
  - Boot 3.2+
  - Spring Cloud 2023.0+
- Virtual Threads (Project Loom)

JDK 22 & 23

JDK 22 - March 2024

- Non-LTS
- Boot 3.3 / Spring Cloud 2023.0.x
- JEP 464 Scoped Values (Preview)
- JEP 462 Structured Concurrency (Preview)
- JEP 458, JEP 463 Learning Java Enhancements
- JEP 457 Class-File API (Preview)

JDK 22 Continued

- JEP 447 Statements before super(...) (Preview)
- JEP 459 String Templates (Preview)
- JEP 423 Region Pinning for G1

JDK 23

- Non-LTS
- Boot 3.4 / Spring Cloud 2024.0.x

https://www.infoworld.com/article/3708329/jdk-22-the-new-features-in-java-22.html

Performance

Stopwatch by M. Oki Orlando from NounProject.com

Virtual Threads - Project Loom

https://docs.spring.io/spring-framework/reference/integration/scheduling.html

https://docs.spring.io/spring-boot/docs/current/reference/html/features.html#features.spring-application.virtual-threads

- "A new degree of scalability for Spring MVC applications"
- Scheduler & Executor support in Spring Framework
- Spring Boot `spring.threads.virtual.enabled=true`
    - Auto-config for Framework, Tomcat and Jetty

Spring Framework 6: Strategic Themes - https://www.youtube.com/watch?v=5jYIKPeo6l4

JMV Checkpoint Restore

https://docs.spring.io/spring-framework/reference/integration/checkpoint-restore.html

https://docs.spring.io/spring-boot/docs/current/reference/htmlsingle/#deployment.efficient.checkpoint-restore

- Coordinated Restore at Checkpoint (CRaC)
- Immediate startup for Spring deployments on HotSpot
- Startup a JVM, take a snapshot, & restore the snapshot
- Lifecycle Management updated for consistent resource handling on stop/restart
- More to come

Class Data Sharing (CDS)

https://docs.oracle.com/en/java/javase/21/vm/class-data-sharing.html

https://docs.spring.io/spring-framework/reference/integration/cds.html

- Reduces startup time & memory footprint
- Mature, included in JDK 10 as JEP 310
- Startup a JVM, createst CDS archive on exit
- Use CDS archive and benefit
- More to come

https://spring.io/blog/2023/12/04/cds-with-spring-framework-6-1

New Clients

Radio by Nick Bluth from NounProject.com

RestClient

https://docs.spring.io/spring-framework/reference/integration/rest-clients.html#rest-restclient

https://docs.spring.io/spring-boot/docs/current/reference/html/io.html#io.rest-client.restclient

- In the beginning was **`RestTemplate`**
- Spring Framework 5 introduced **`WebClient`**: a non-blocking, reactive HTTP client with a fluent API, but…
- **`RestClient`** is the synchronous analog to **`WebClient`**

RestClient

```
@Service
public class MyService {

    private final RestClient restClient;

    public MyService(RestClient.Builder builder) {
        this.restClient = builder.baseUrl("https://example.org").build();
    }

    public Details someRestCall(String name) {
        return this.restClient.get()
             .uri("/{name}/details", name)
             .retrieve()
             .body(Details.class);
    }

}
```

JdbcClient

https://docs.spring.io/spring-framework/reference/data-access/jdbc/core.html#jdbc-JdbcClient

https://docs.spring.io/spring-boot/docs/current/reference/html/data.html#data.sql.jdbc-client

- In the beginning was **`JdbcTemplate`**
- **`JdbcClient`** is unified JDBC client API with a fluent interaction model

JdbcClient

```
@Component
public class MyBean {

    private final JdbcClient jdbcClient;

    public MyBean(JdbcClient jdbcClient) {
        this.jdbcClient = jdbcClient;
    }

    public Optional<Actor> findActorById(long id) {
        String sql = "select first_name, last_name from t_actor where id = ?";
        return this.jdbcClient.sql(sql)
            .param(1212L);
            .query(Actor.class)
            .optional();
    }

}
```

Jetty HttpClient

https://docs.spring.io/spring-framework/reference/integration/rest-clients.html#rest-request-factories

https://docs.spring.io/spring-boot/docs/current/reference/html/io.html#io.rest-client.clienthttprequestfactory

- The Jetty HttpClient is now supported in **`RestTemplate`**, **`RestClient`**, and **`WebClient`**.

Testing

testing by littlestar23 from NounProject.com (CC BY 3.0)

https://docs.spring.io/spring-boot/docs/current/reference/html/features.html#features.testing

Testcontainers

https://docs.spring.io/spring-boot/docs/current/reference/html/features.html#features.testing.testcontainers

https://testcontainers.com/

- The Testcontainers library provides a way to manage services that run inside Docker containers during testing.
- Supports native **`@Testcontainers`** & **`@Container`** annotations.
- The Spring Boot **`@ServiceConnection`** annotation bridges metadata (host, ports, etc.) from Testcontainers to Spring Boot configuration.
- Support for many technologies by default, including RabbitMQ, Kafka, MongoDB, Neo4j, JDBC databases, Flyway and more.

Testcontainers

```
@Testcontainers
@SpringBootTest
class MyIntegrationTests {

    @Container
    @ServiceConnection
    static Neo4jContainer<?> neo4j = new Neo4jContainer<>("neo4j:5");

    @Test
    void myTest() {
        // ...
    }

}
```

Testcontainers DevEx

https://docs.spring.io/spring-boot/docs/current/reference/html/features.html#features.testcontainers

https://testcontainers.com/

- What about just running my app?
- Spring Boot provides SpringApplication.from() to launch your app with the 'test' classpath and allows configuring Testcontainers to bootstrap external dependencies.
- `Container` beans lifecycle(start/stop) is managed by Spring boot

Testcontainers DevEx

```
public class TestMyApplication {

    public static void main(String[] args) {
        SpringApplication.from(MyApplication::main).run(args);
    }

}

@TestConfiguration(proxyBeanMethods = false)
public class MyContainersConfiguration {

    @Bean
    @RestartScope // use with DevTools to keep state between restarts
    @ServiceConnection
    public Neo4jContainer<?> neo4jContainer() {
        return new Neo4jContainer<>("neo4j:5");
    }

}
```

Docker Compose

https://docs.spring.io/spring-boot/docs/current/reference/html/features.html#features.docker-compose

https://docs.docker.com/compose/

- Docker Compose is to provide and manage multiple containers for required services.
- Spring Boot provides the **`spring-boot-docker-compose`** modules to manage the lifecycle of the locally installed **`` `docker compose` ``** command.
- Spring Boot creates service connection beans for supported containers.

New Projects

new by Ilham Fitrotul Hayat from Noun Project (CC BY 3.0)

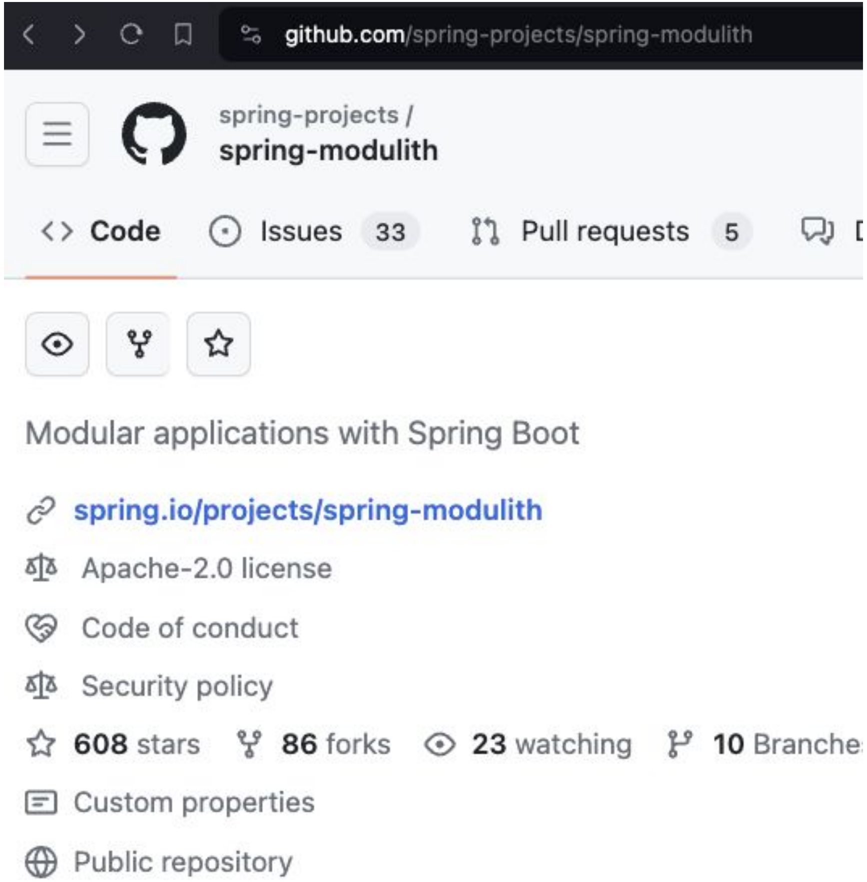
Spring Modulith

Supports Spring Boot developers to implement **logical modules** in a loosely coupled way.

Includes:

- Structural validation
- Documentation
- Testing
- Runtime observation

https://docs.spring.io/spring-modulith/reference/



github.com/spring-projects/spring-modulith

spring-projects /
spring-modulith

Modular applications with Spring Boot

spring.io/projects/spring-modulith

Apache-2.0 license

Code of conduct

Security policy

608 stars **86** forks **23** watching **10** Branche

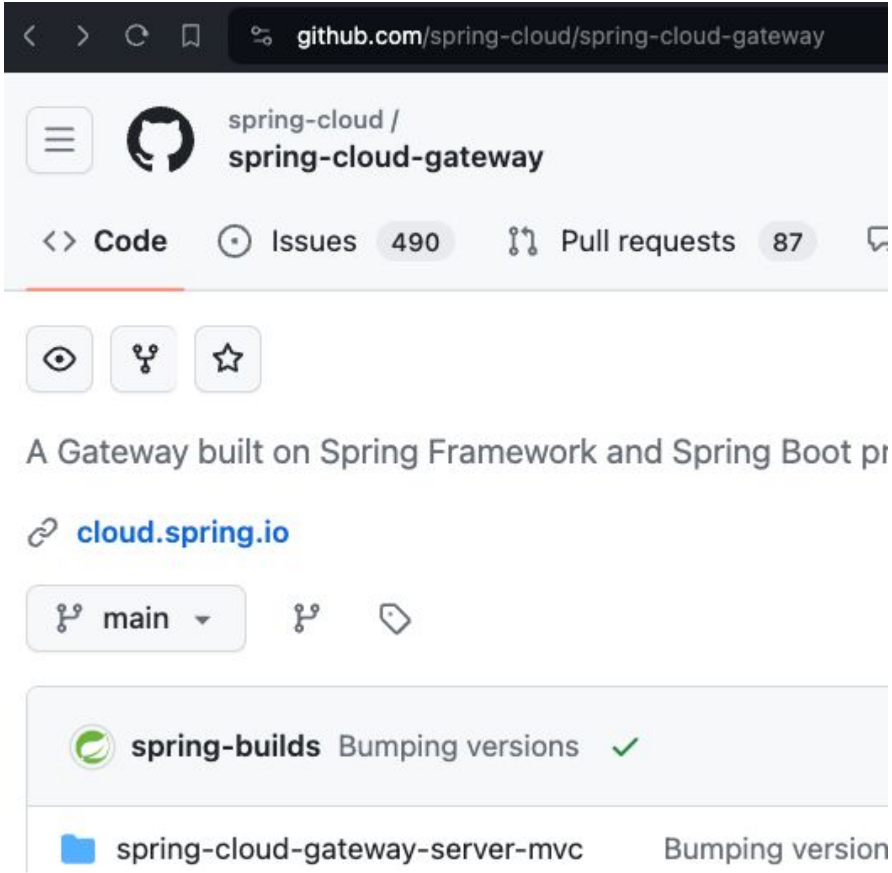
Custom properties

Public repository

Spring Cloud Gateway MVC

An API Gateway built on Spring WebMvc.fn

- Virtual Threads - Project Loom
- Many Predicates and Filters
- Simplicity
- Explicit vs Implicit
- Org Requires Tomcat or similar
- Embed in Spring MVC Apps
- https://youtu.be/UyxUkAagLFs



github.com/spring-cloud/spring-cloud-gateway

spring-cloud /
spring-cloud-gateway

A Gateway built on Spring Framework and Spring Boot pr

cloud.spring.io

spring-builds Bumping versions ✓

spring-cloud-gateway-server-mvc Bumping version

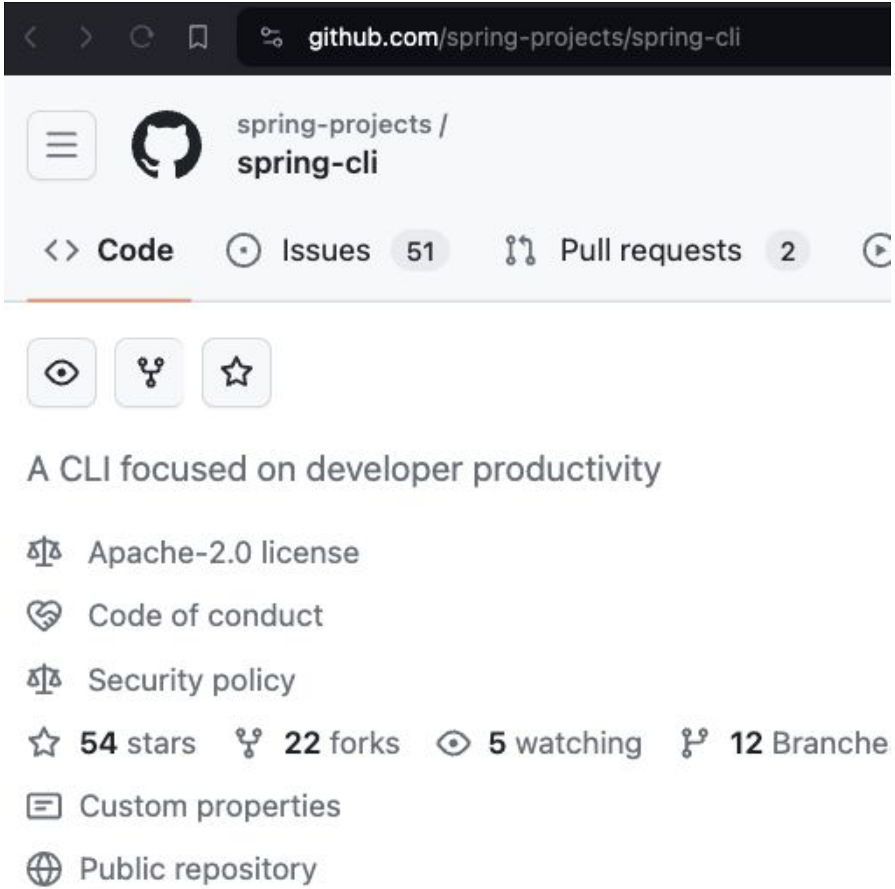
spring https://docs.spring.io/spring-cloud-gateway/reference/spring-cloud-gateway-server-mvc.html

Spring CLI

Built to help create new Spring Boot projects and add functionality to existing projects.

- Built on Spring Shell
- `boot new`
- `boot add`
- AI Commands *(see next slide)*
- Initializr support
- More to come

https://docs.spring.io/spring-cli/reference/



github.com/spring-projects/spring-cli

spring-projects /
spring-cli

A CLI focused on developer productivity

Apache-2.0 license

Code of conduct

Security policy

54 stars 22 forks 5 watching 12 Branche

Custom properties

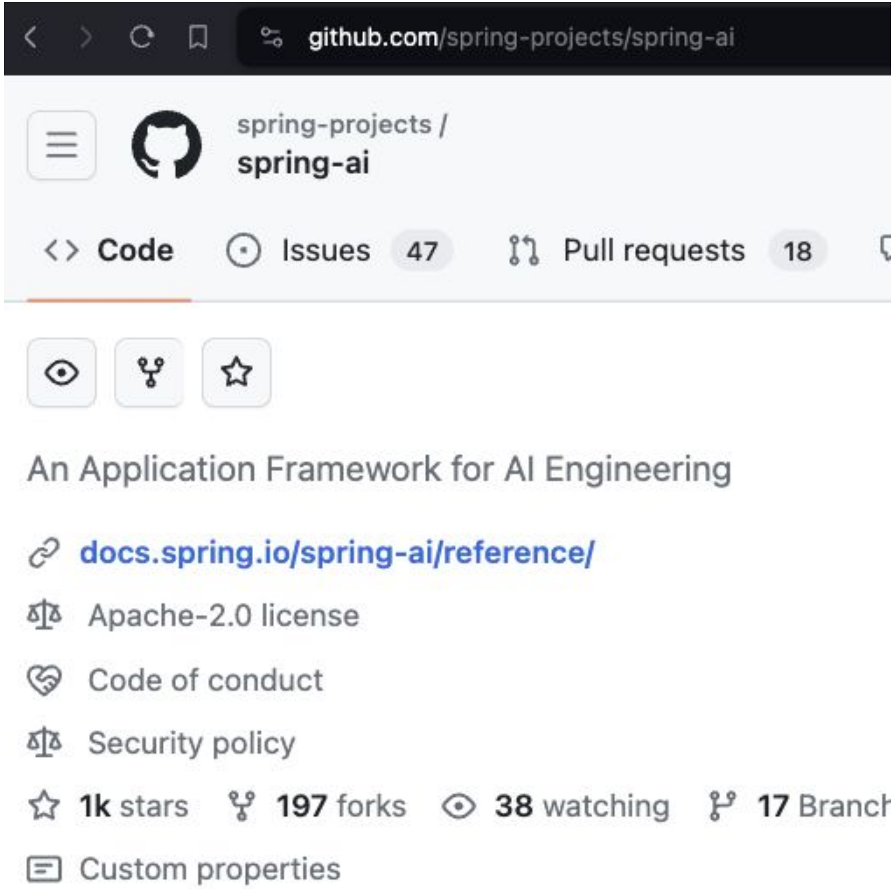
Public repository

Spring AI

Allows integration of artificial intelligence to Spring Boot applications without unnecessary complexity.

- `ChatClient`, `EmbeddingClient`, and `VectorStore` interfaces
- `PromptTemplate` class
- OpenAI, Azure OpenAI, HuggingFace, Ollama and other implementations
- Spring Boot starters
- Spring CLI commands
    - `` `spring boot new ai` ``
    - `` `spring boot add ai` ``

https://docs.spring.io/spring-ai/reference/



An Application Framework for AI Engineering

docs.spring.io/spring-ai/reference/

Apache-2.0 license

Code of conduct

Security policy

1k stars 197 forks 38 watching 17 Branch

Custom properties

Roadmap

Map by Endri Widada from NounProject.com

Support for the Previous Generation

Support Timelines (End Dates)

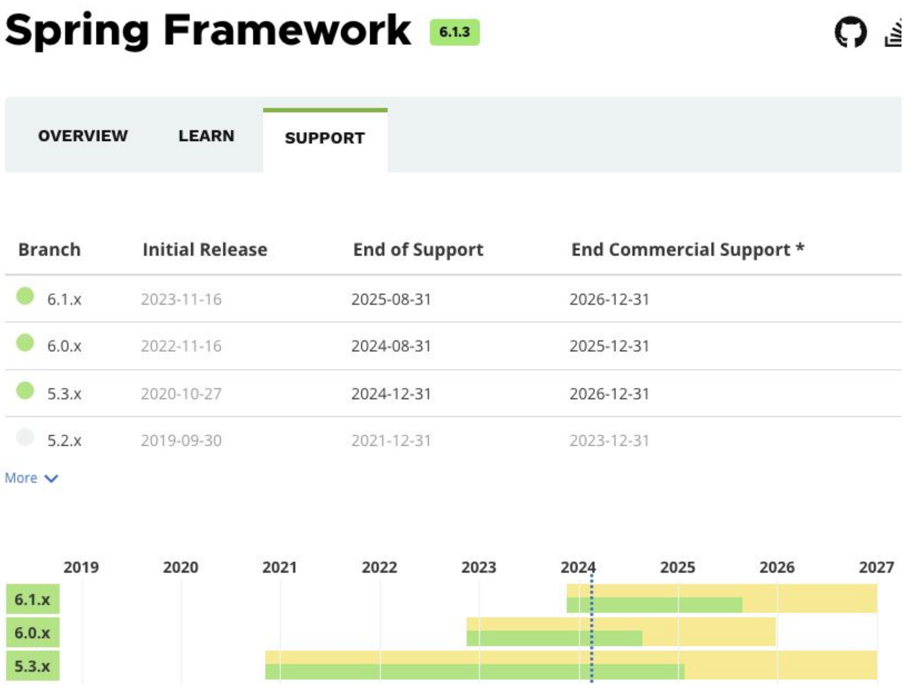
Spring Framework

- 5.3.x OSS Dec 2024, Commercial Dec 2026
- 6.0.x OSS Aug 2024, Commercial Dec 2025
- 6.1.x OSS Aug 2025, Commercial Dec 2026

Spring Boot/Spring Cloud

- 2.7.x/2021.0.x ~~OSS Nov 2023~~, Comm Aug 2024
- 3.0.x/2022.0.x ~~OSS Nov 2023~~, ~~Comm Feb 2024~~
- 3.1.x/2023.0.x OSS May 2024, Comm Aug 2025
- 3.2.x/2023.0.x OSS Nov 2024, Comm Feb 2026

See spring.io for individual projects



Spring Framework 6.1.3

Branch	Initial Release	End of Support	End Commercial Support *
● 6.1.x	2023-11-16	2025-08-31	2026-12-31
● 6.0.x	2022-11-16	2024-08-31	2025-12-31
● 5.3.x	2020-10-27	2024-12-31	2026-12-31
○ 5.2.x	2019-09-30	2021-12-31	2023-12-31

New in 2024

More CDS

- Buildpack support
- Exploded Jar Layout
  - Spring Boot build plugins Issue #38276
- Project Leyden (CDS on steroids)
- AOT for HotSpot, CRaC & Leyden

Spring Framework 6.2

- Jakarta EE 11

Commercial Releases

- Quarterly
- CVEs and Customer-requested bug fixes
- Dependency updates, patch level only
- Private maven repository

Roadmap

When will Spring Framework and Friends GA?

- Spring Framework 6.2.0
  - Milestones (Mx) Summer 2024, Release Candidates Early Fall 2024
  - GA - Mid to late Fall 2024
- Spring Boot
  - 3.3.0 - M2 Feb 2024, M3 Mar 2024, RC1 Apr 2024, GA May 2024
    - Corresponding Spring Cloud 2023.0.x release compatible with 3.3.0
  - 3.4.0 - Milestones after Framework 6.2 milestone, RC1 Oct 2024, GA Nov 2024
- Spring Cloud 2024.0.0
  - M1 (Jun), M2 (Jul), M3 (Aug), M4 (Sep), RC1 (Oct)
  - GA - Late Nov, arly Dec following Spring Boot 3.4.0 GA

Questions

Thank you

https://gibb.tech/preso/confoo-2024-whats-new-in-spring/

@spencerbgibb

social.sdf.org/@spencergibb

Question by Mani Cheng from NounProject.com
Tweet by James Smith from NounProject.com
Mastodon by Icon 54 from iconscout.com

Divider Slide Title

Single column of content

When allocating resources for a critical application they were delivering, the company set aside a large team.

- Which virtualization technologies are in use for application deployment?
- Are any additional virtualization technologies being explored? Public cloud?
- What tools & automation are used for application operations?
- What is the process for maintaining, patching and upgrading environments today?
- Are you using/exploring Continuous Integration and Continuous Delivery pipelines?
- Which app servers and databases are used e.g. Tomcat, Weblogic, Websphere etc?
- How is Business success measured? Key metrics?

Content with sidebar

When allocating resources for a critical application they were delivering.

- Which virtualization technologies are in use for application deployment?
- Are any additional virtualization technologies being explored? Public cloud?
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Which virtualization technologies are in use for application deployment?

Are any additional virtualization technologies being explored? Public cloud?

What tools & automation are used for application operations?

What is the process for maintaining, patching and upgrading environments today?

Two columns of content

Headline for column 1

- Which virtualization technologies are in use for application deployment?
- Are any additional virtualization technologies being explored? Public cloud?
- What tools & automation are used for application operations?
- What is the process for maintaining, patching and upgrading environments today?
- Are you using/exploring Continuous Integration and Continuous Delivery pipelines?

Headline for column 2

- Which virtualization technologies are in use for application deployment?
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Three columns of content

Headline for column 1

- Which virtualization technologies are in use for application deployment?
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Headline for column 2

- Which virtualization technologies are in use for application deployment?
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Headline for column 3

- Which virtualization technologies are in use for application deployment?
- Are any additional virtualization technologies being explored? Public cloud?
- What tools & automation are used for application operations?

Centered Text Template

Spring Logo and Project Icons

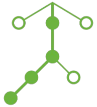
Spring
Boot

Spring
Cloud

Spring
Framework

Spring Cloud
Data Flow

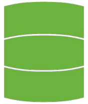
Spring Tool
Suite



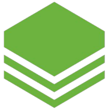
Spring
LDAP

Spring
Cloud Gateway

Spring
Security

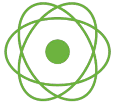


Spring
Data



Spring
Batch

Spring
Integration



Project
Reactor

Spring
Kafka

Spring
for GraphQL

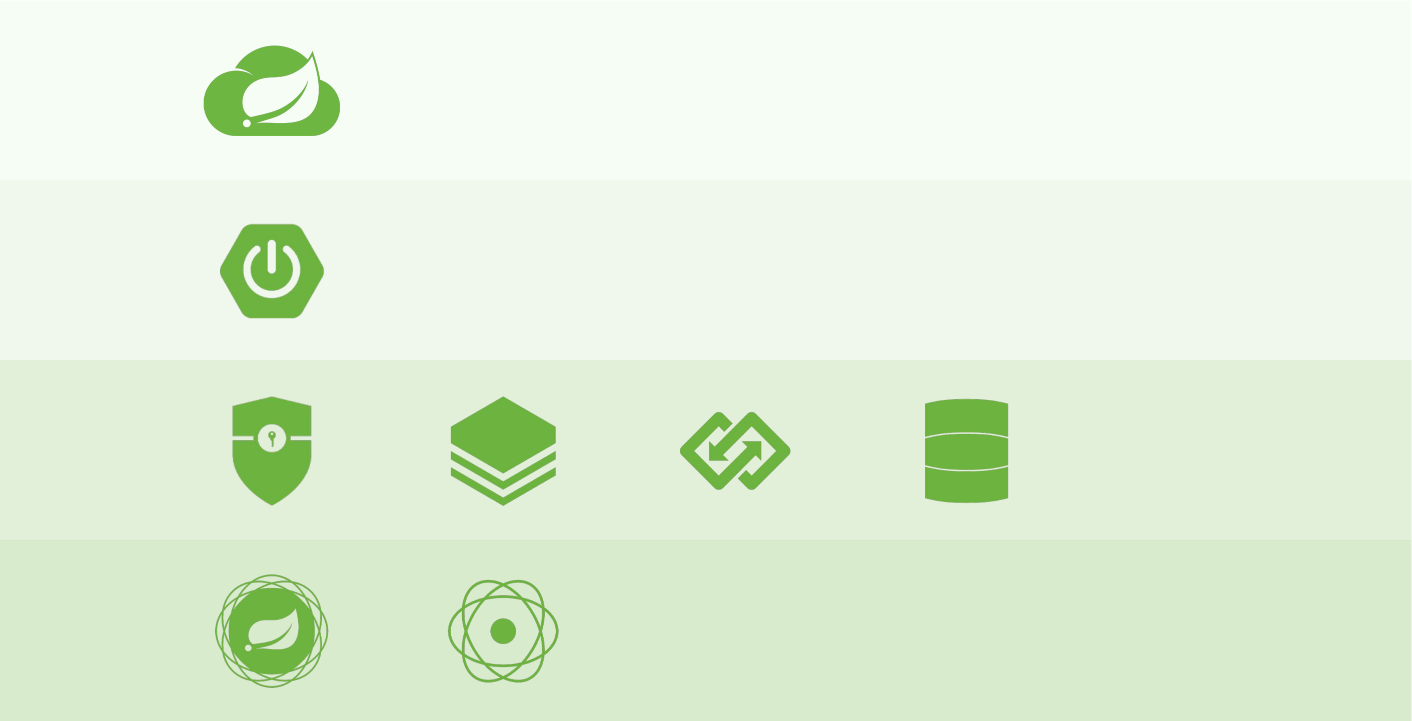
Spring
Web Services

Spring
Web Flow

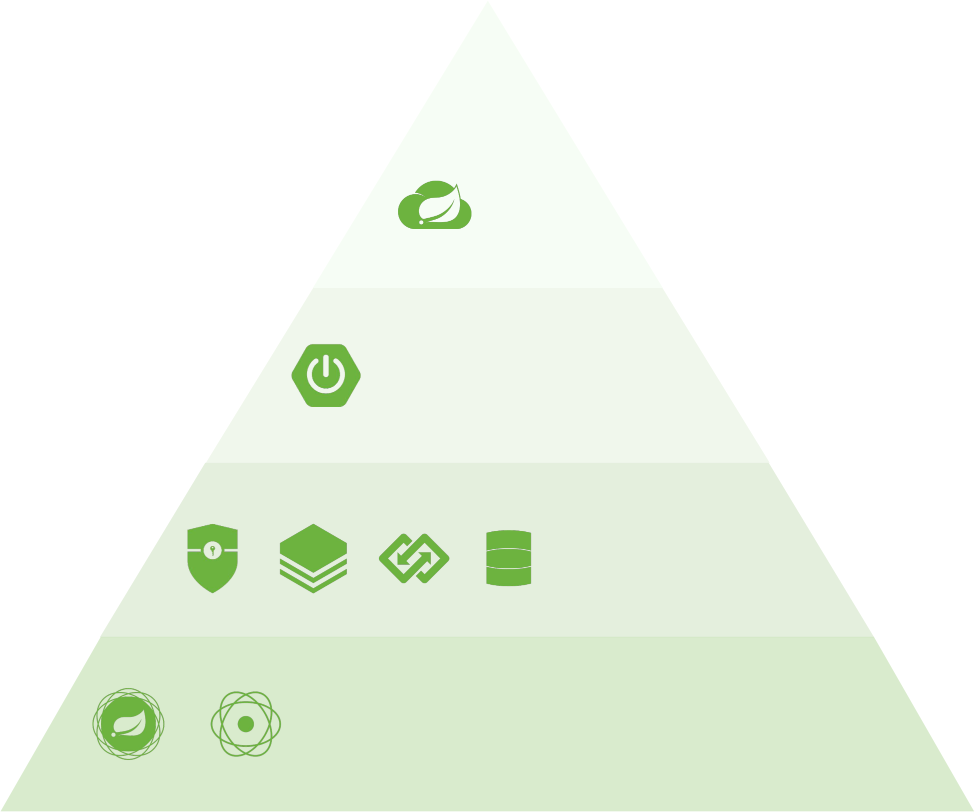
Spring
Hateoas

Spring
AMQP

Spring Project Icons Hierarchy Template #1



Spring Project Icons Hierarchy Template #2



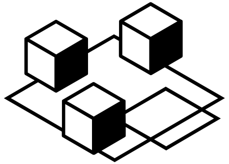
Code Block Template #1

```
@SpringBootApplication
@RestController
public class DemoApplication {

@GetMapping("/helloworld")
public String hello() {
return "Hello World!";
```

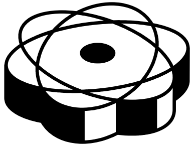
Code Block Template #2

```
@SpringBootApplication
@RestController
public class DemoApplication {

@GetMapping("/helloworld")
public String hello() {
return "Hello World!";
```

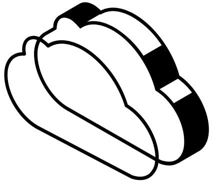
Icons



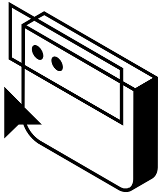
Microservices



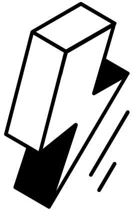
Reactive



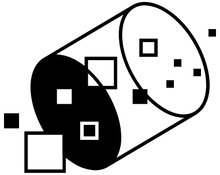
Cloud



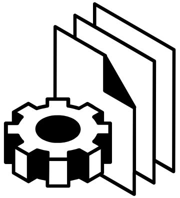
Web Apps



Serverless

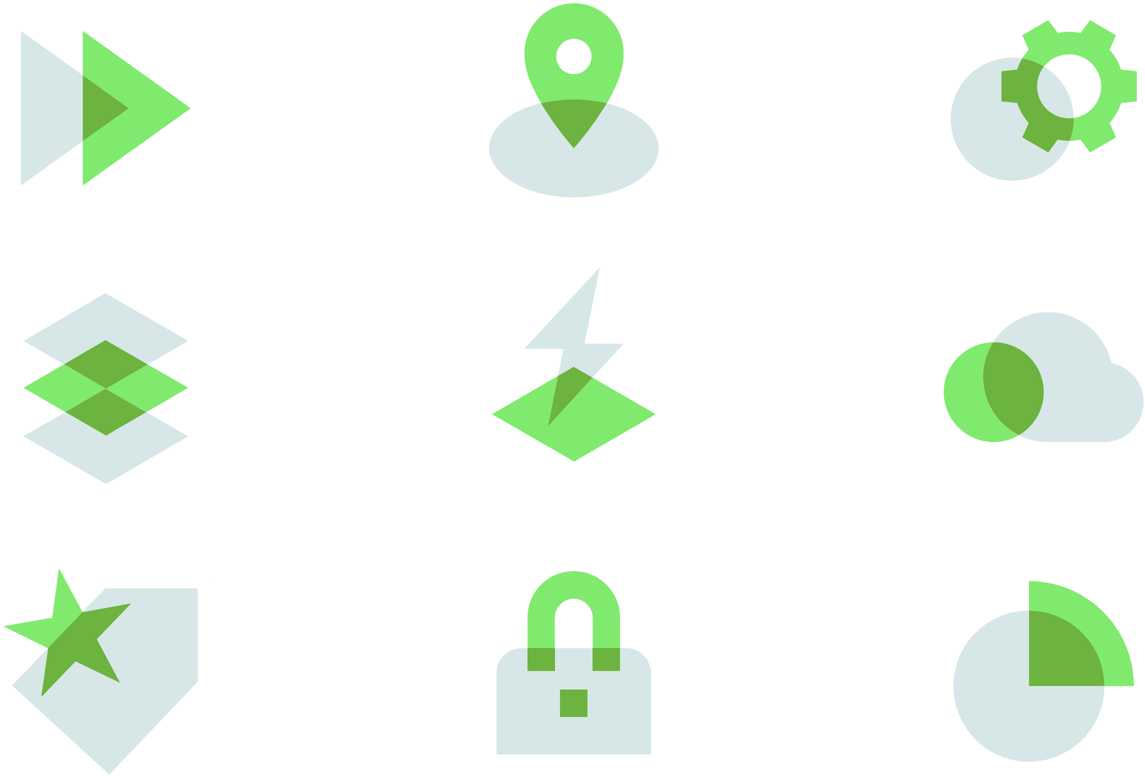


Event Driven



Batch

Abstract Icons



Why Spring?

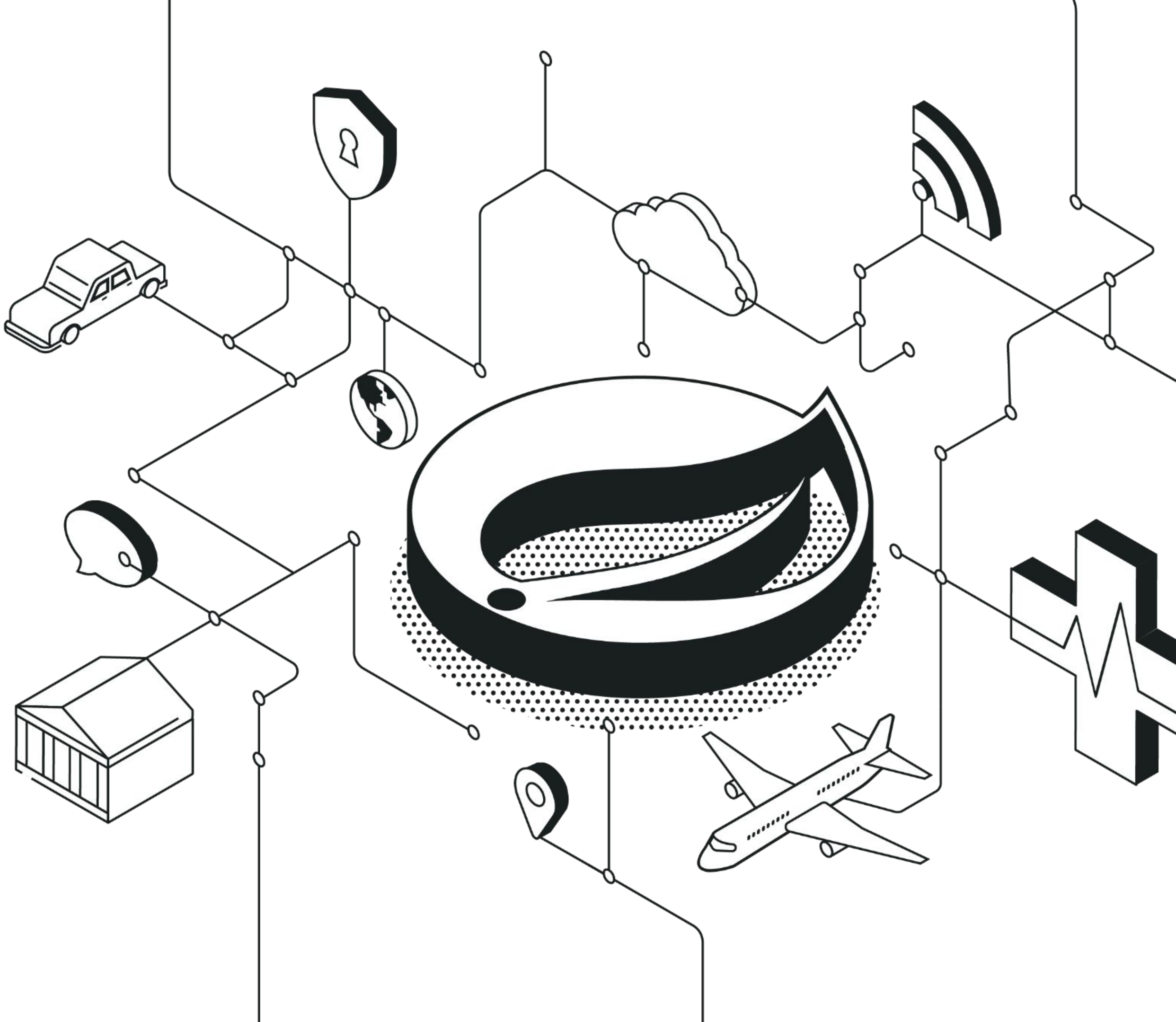


Diagram Kit

Diagram Examples

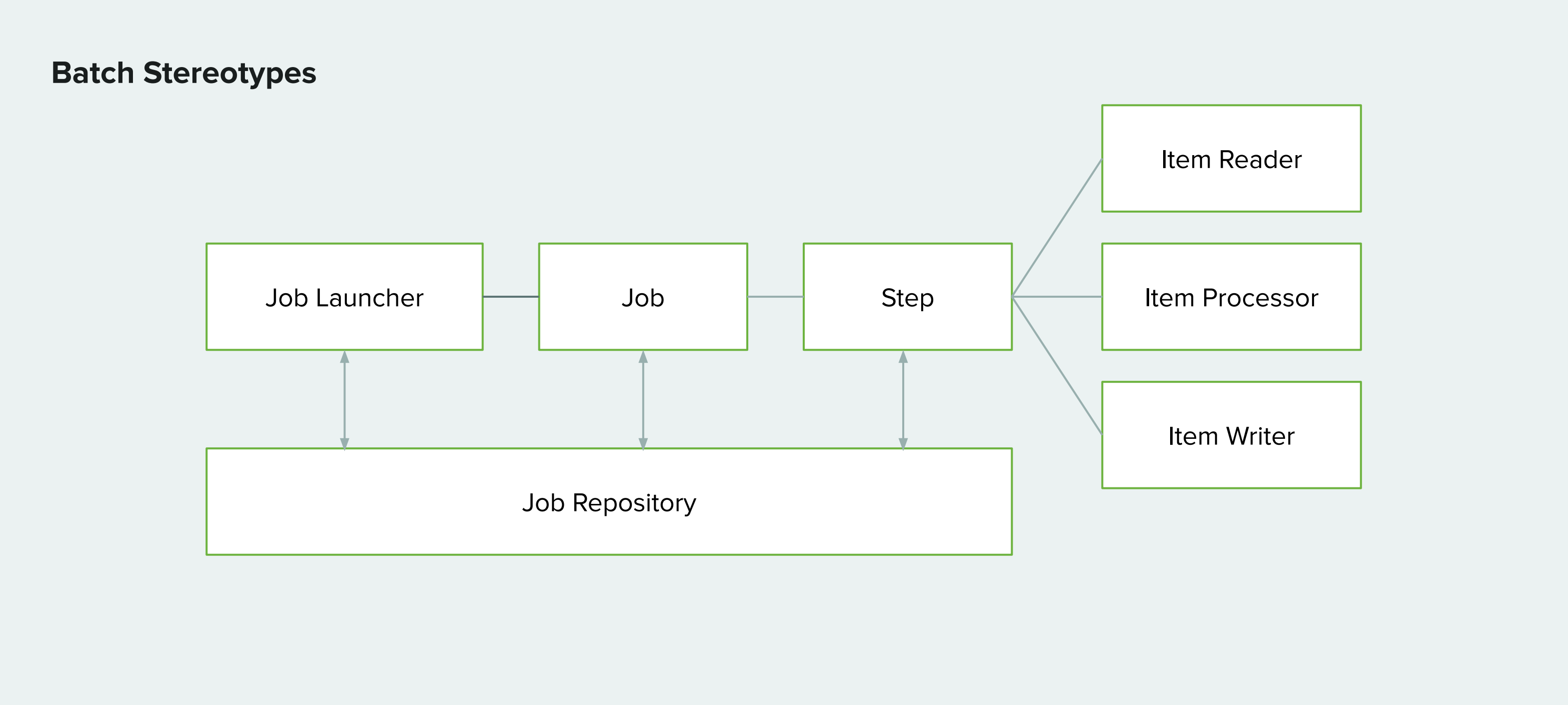


Diagram Examples

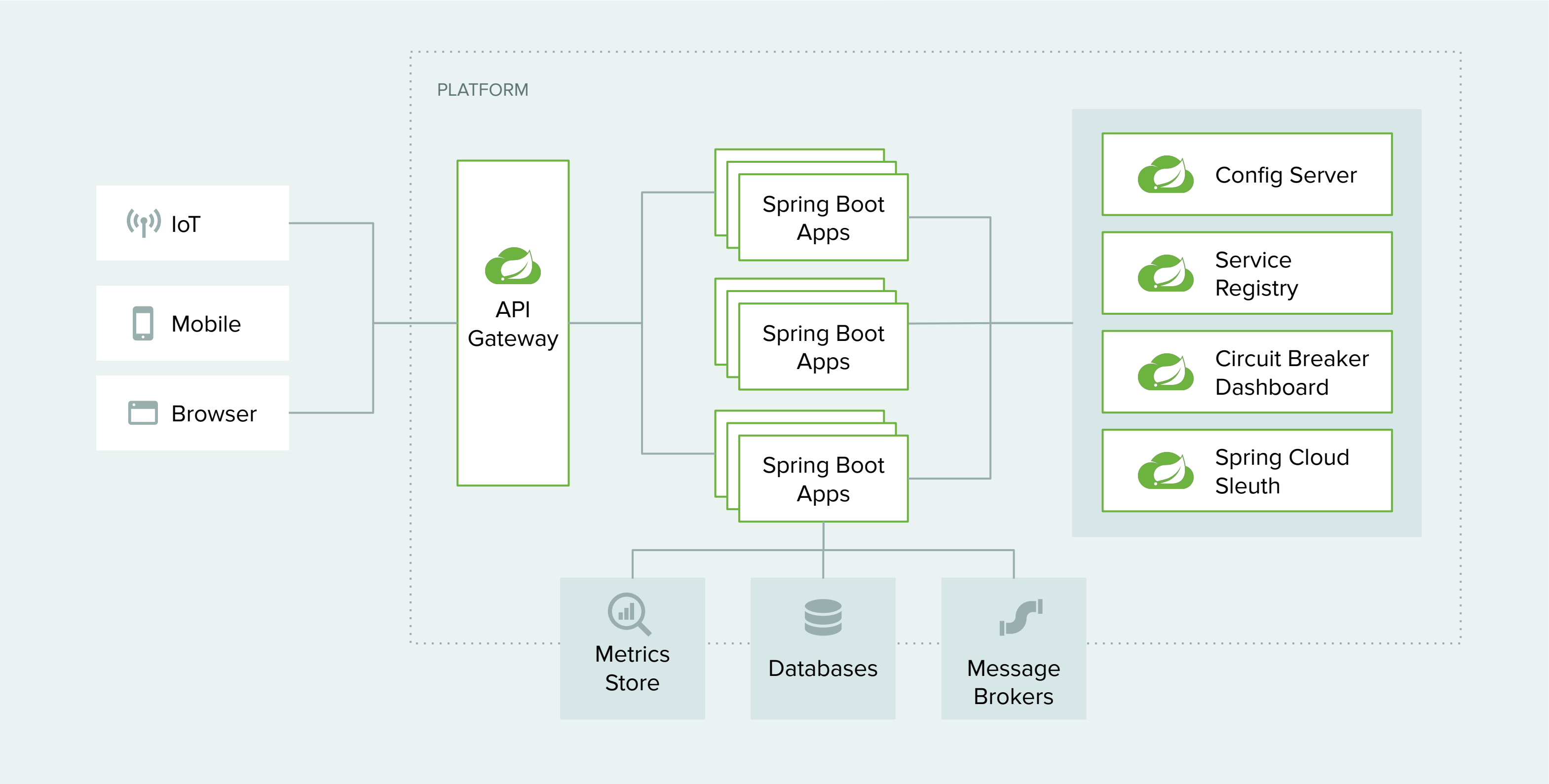
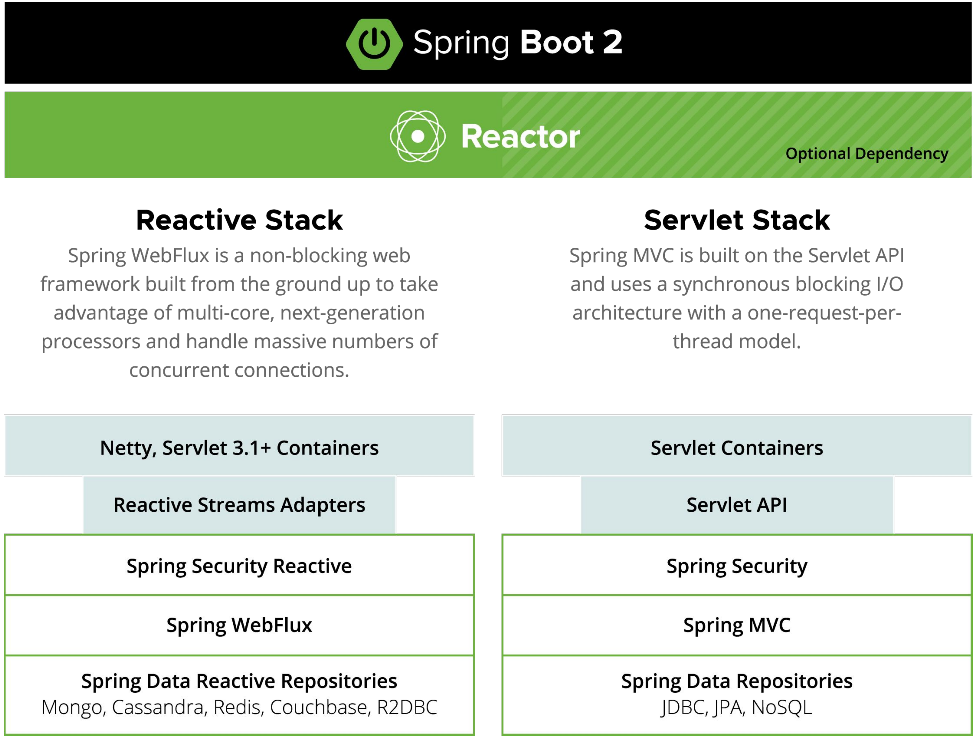


Diagram Examples



Spring **Boot 2**

Reactor

Optional Dependency

Reactive Stack

Spring WebFlux is a non-blocking web framework built from the ground up to take advantage of multi-core, next-generation processors and handle massive numbers of concurrent connections.

Servlet Stack

Spring MVC is built on the Servlet API and uses a synchronous blocking I/O architecture with a one-request-per-thread model.

Netty, Servlet 3.1+ Containers

Reactive Streams Adapters

Spring Security Reactive

Spring WebFlux

Spring Data Reactive Repositories
Mongo, Cassandra, Redis, Couchbase, R2DBC

Servlet Containers

Servlet API

Spring Security

Spring MVC

Spring Data Repositories
JDBC, JPA, NoSQL