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Spring Boot Introduction

Introduction to Spring Boot

Objectives

After completing this lesson, you should be able to

- Explain what Spring Boot is and why it is opinionated
- Explain each major feature of Spring Boot and its value proposition

Agenda

- **Why Spring Boot?**
- Spring Boot Features
  - Dependency mgmt
  - Auto-Configuration
  - Actuators & Health Metrics
  - Packaging and Runtime
  - Integration Testing
- Summary

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Why Spring Boot?

- Enable developers to build applications that are:
  - Easy to develop and test
  - Easy to manage dependencies
  - Easy to configure
  - Easy to manage and monitor in production
  - Cloud ready
- Keep developers focused on building business value, less on non-functional concerns

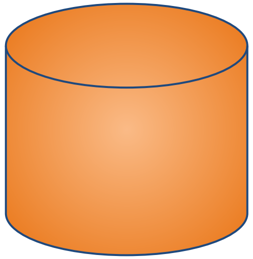
Spring's DRY principle applied to itself!

Consider a App that Integrates with a Database ...

- Requirement
  - Simple Spring application
  - Talking to a database
  - Running in production

Requirement

- Assume basic domain logic exists
  - Need plumbing for the domain logic to talk to a Relational Database ...



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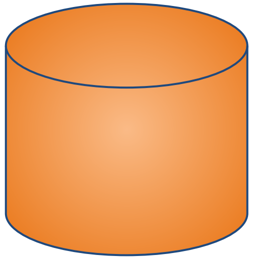
Implementing Data Access *without* Spring Boot, You need

- A database for the app to talk to …
- A JDBC Driver on the application classpath …
- Configuration for JDBC driver to connect to the actual database …
- Loading the JDBC Driver in the application …
- Code for the data source to use the JDBC driver …
- Code for the JdbcTemplate to use the DataSource …
- Dependencies for other data access APIs added to project …
    - Such as JPA, MyBatis or other mapping tools
- … *Finally, we can access data in the application!*

Create same Application *with* Spring Boot

- *How can we improve the situation?*

- Provide a database for the app to talk to …
  - Add appropriate dependency JAR
- Connect to the actual database …
  - Define configuration properties for Boot to use
- Use the JdbcTemplate logic in your application
  - JdbcTemplate automatically created by Spring Boot



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But what about Production Hardening?

- *How do we monitor for, or handle the database connection failures?*
- *What if we want to expose realtime business metrics to a production monitoring solution via our domain logic?*
- Solutions are likely hand-coded, or 3rd party solution integrated by hand.

Production Hardening with Spring Boot

- View status and configuration via JMX or REST
  - Spring Boot “*Actuators*”
- Solutions for Database health checks are included “out of the box”
- Spring Boot provides clean, standards-based API for custom metrics
  - *Project Micrometer*

http://micrometer.io

Spring Boot vs. Spring

- For simple Spring applications, we can reduce the number of “plumbing” steps by nearly 70% by using Spring Boot!

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Spring Initializr - What is it?

- Framework, API, and default implementation to generate initial Spring Boot application projects

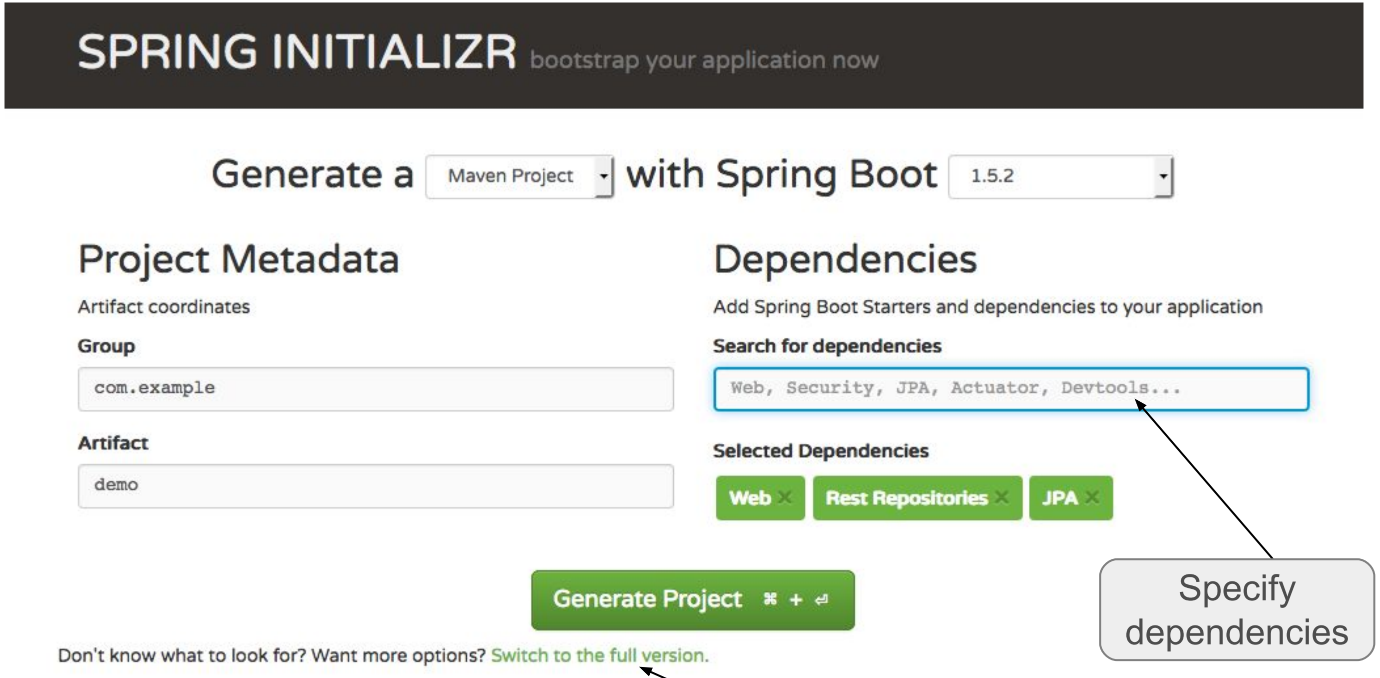
- Spring's public web-site: http://start.spring.io

- Or build your own: https://github.com/spring-io/initializr

Spring Initializr - What is its value?

- Simplify and curate dependency management
    - Gradle or Maven supported
    - Java, Groovy or Kotlin
    - Builds Spring Boot projects for you
- Enable oversight of application dependencies
- Reduced “Dependency Hell”
- Accessible as a “New Project” wizard in STS/Eclipse, IntelliJ IDEs

Spring Initializr Web Page
http://start.spring.io



SPRING INITIALIZR bootstrap your application now

Generate a Maven Project with Spring Boot 1.5.2

Project Metadata

Artifact coordinates

Group: com.example

Artifact: demo

Dependencies

Add Spring Boot Starters and dependencies to your application

Search for dependencies: Web, Security, JPA, Actuator, Devtools...

Selected Dependencies: Web, Rest Repositories, JPA

Don't know what to look for? Want more options? Switch to the full version.

Specify dependencies

Switch to full version: more options, explicit check-list of dependencies

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Starter - What is it?

- Bill-of-Materials (BOM) of Spring and 3rd party dependencies
- Leverages Maven Dependency Management
- Support for Gradle also
    - Custom Spring Boot plugin needed

Starter - What is its value?

- Simplify and curate dependency management
- Use of standard build dependency mechanism makes adoption and customization easier

Agenda

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Auto-Configuration - What is it?

- Mechanism to detect dependencies through classpath, beans, and config properties
- Create Spring Bean configuration on developer’s behalf based on reasonable default assumptions during start time.
- Existing auto-configuration rules may be overridden or disabled
- New auto-configuration may be built to support new backing resources or features.

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Auto-Configuration - What is its value?

- Reduce burden on developers for common Spring bean configuration tasks

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Actuator - What is it?

- Framework to enable monitoring and management of Spring Boot applications
- Provides clean API exposing telemetry to common 3rd party monitoring tools
- Provides standard method of HTTP health indicators

Actuator - What is its value?

- Reduce burden on developers for non-functional efforts
- Reduce integration efforts between application and monitoring/management tools

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Packaging and Runtime - What is it?

- Spring Boot provides tools for building application deployment artifacts such as jar, war or launch scripts
  - As part of Maven “package” goal or Gradle “assemble” task
- Spring Boot allows embedding of web runtime containers, such as Tomcat, Jetty or Undertow

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Packaging and Runtime - What is its value?

- Reduce burden on developers for non-functional efforts
- Reduce need for Middleware

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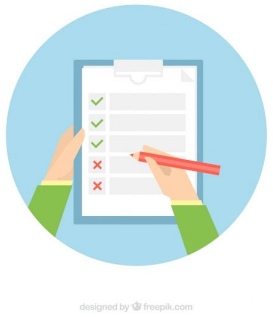
Integration Testing Support - What is it?

- Spring Boot test tools that provide Spring application environment bootstrap for JUnit component integration tests



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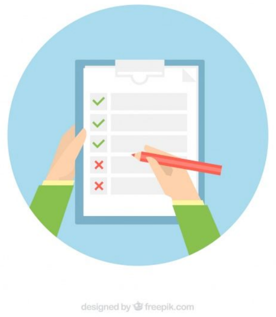
Integration Testing Support - What is its value?

- Reduce burden on developers for writing test plumbing code



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What we Covered

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Spring Boot in Summary

- An opinionated runtime for Spring Projects
- Supports different project types like Web and Batch
- Handles most low-level, predictable setup for you

- *It is NOT*
  - A code generator
  - An IDE plug-in

See: Spring Boot Reference
http://docs.spring.io/spring-boot/docs/current/reference/htmlsingle

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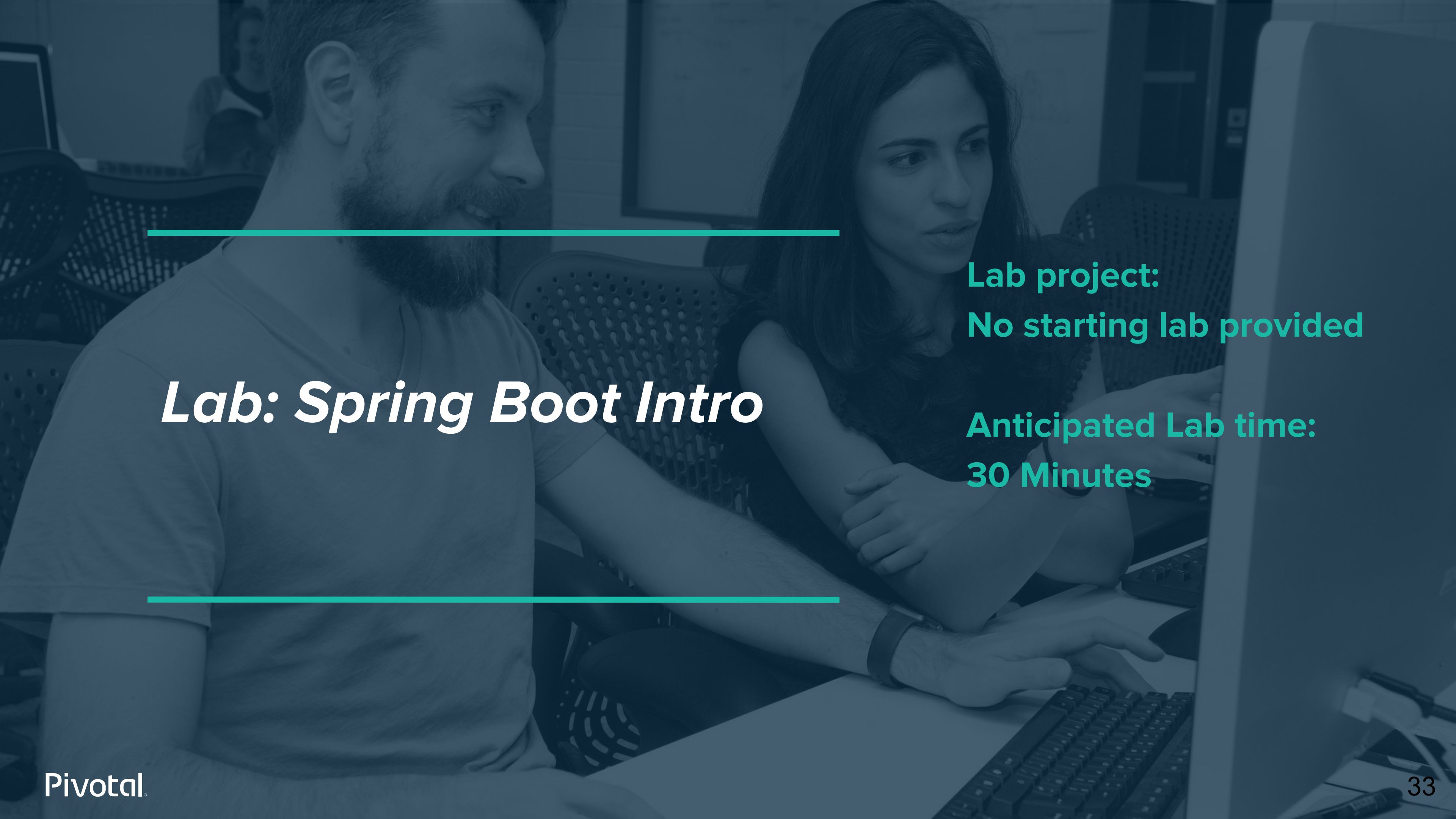
Opinionated Runtime

- Uses sensible defaults, *"opinions"*, mostly based on the classpath contents
  - Sets up a JPA Entity Manager Factory if a JPA implementation is on the classpath
  - Creates a **`JdbcTemplate`** if **`spring-jdbc.jar`** is on the classpath
- Everything can be overridden easily but often not necessary

Tying Things Together…

- Spring Boot provides an application holistic plumbing support for backing resources and features:
  - Databases
  - Caching
  - Integration Middleware
  - Security
  - Fault Tolerance features
  - Running on Cloud/Cloud Native infrastructures
  - Template engines
  - Web containers
  - External configuration



Lab: Spring Boot Intro

Lab project:

No starting lab provided

Anticipated Lab time:

30 Minutes

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