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By and for the Java community 

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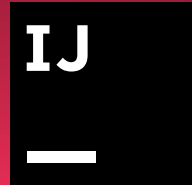
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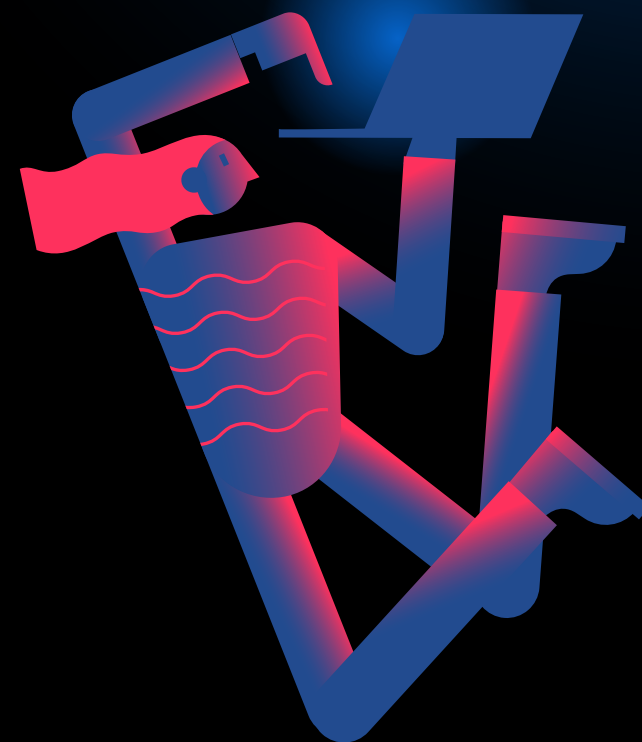


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//from the editor/



Using Comments to Design Classes

What is the first thing you write when creating a new class?

Like most developers, I believe, I create classes of two distinct types: the ones where my head is full of contextual information and I need to bang out a class that meets my immediate needs, and the ones that I patiently and carefully design. The former constitute the majority of my classes, alas, and they are initially sloppy beasts: I hit a keystroke combo and the IDE creates a new class with the copyright block in place, I give it a name, and I immediately start hacking. (If I'm refactoring code, then the IDE will either pull in the code from another class or generate new code for me. I love today's tools!) I can go for a while putting into the code all the things teeming in my brain without fear that I am creating an unsightly tangle. My lack of fear is because I know I will refactor the code, write the necessary tests, compile it, finish cleaning it up, run the tests, and move on.

But I'm increasingly coming to the opinion that this series of steps, which is familiar to every developer, creates a lot of unnecessary activity. A better approach is to write down all the same data in words rather than code. Suppose instead of code, I wrote the following comments:

This class validates a ticket number by computing a pair of check digits. Since we acquired [company name], the check-digit algorithm varies by vendor, so first look up the vendor #. The constructor accepts the ticket number, and the principal method returns an enum indicating a valid number or the type of error. All exceptions are caught and converted to error enums. This method is called only by [class name] and so should be private.

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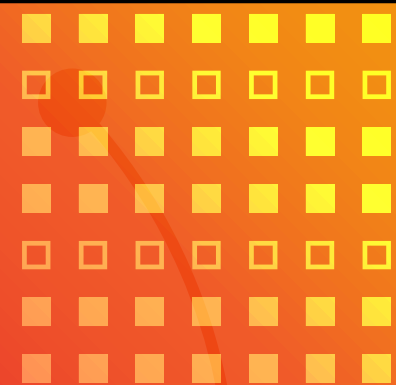
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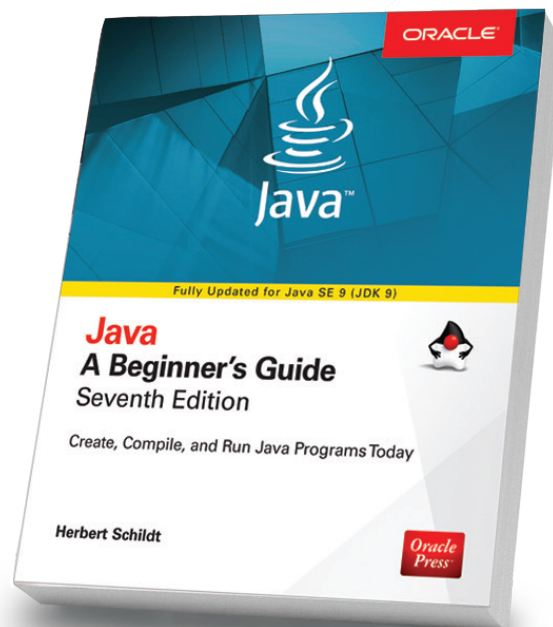
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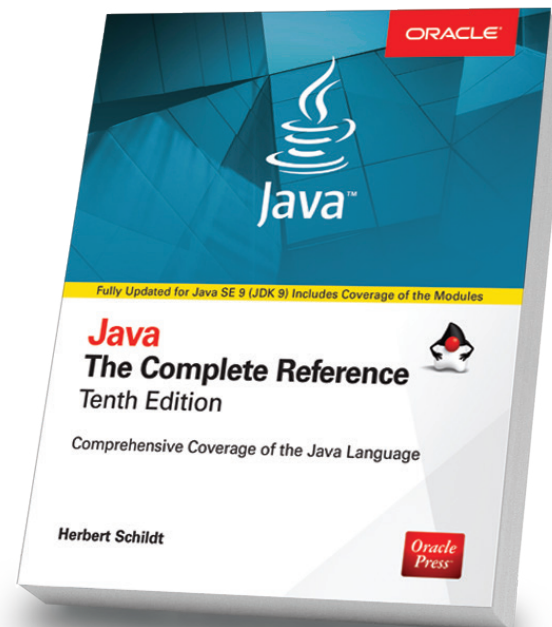
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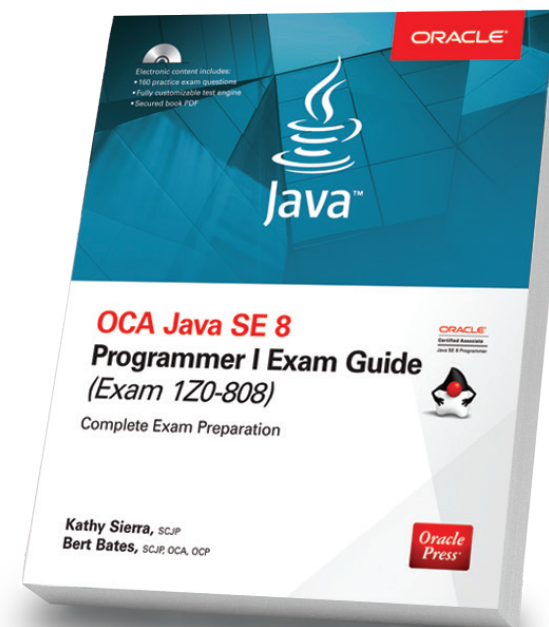
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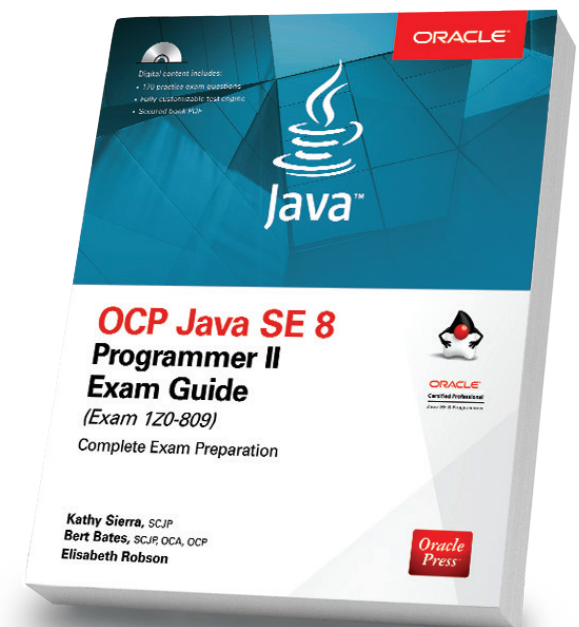
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//events/



Oracle Code One

OCTOBER 22–25

SAN FRANCISCO, CALIFORNIA

The annual JavaOne event has been remade as Oracle Code One, a new developer conference that includes more languages, technologies, and developer communities. Look for talks on Go, Rust, Python, JavaScript, and R, along with the great Java technical content that developers expect. Topics will include microservices, containers, AI, chatbots, blockchain, and databases. A Java keynote and community keynote will remain, and all of the Java-focused community activities are being carried forward including IGNITE sessions, Community Day (now as a track), Java Champion briefings, and Duke's Choice Awards. (Note that registration is to Oracle OpenWorld, which is collocated with Oracle Code One.)

JSCamp

SEPTEMBER 22

CHICAGO, ILLINOIS

JSCamp is a one-day single-track conference for developers interested in JavaScript. Speakers will cover topics such as Node, React, Vue, and Ember for both beginners and experts.

jDays

SEPTEMBER 25

GOTHENBURG, SWEDEN

jDays brings together software engineers from around the world to share their experiences in different areas such as Java, software engineering, IoT, digital trends, testing, agile methodologies, and security.

Strange Loop

SEPTEMBER 26–28

ST. LOUIS, MISSOURI

Strange Loop is a multidisciplinary conference that brings together the developers and thinkers building tomorrow's technology in fields such as emerging languages, alternative databases, concurrency, distributed systems, and security. Talks are generally code-heavy and not process-oriented.

Functions

SEPTEMBER 28

TORONTO, CANADA

Functions is a community-focused, single-track conference exploring serverless development and architecture. Past conference speakers have included JS Foundation's Darcy Clarke and Google's Sandeep Dinesh.

NFJS New England Software Symposium

SEPTEMBER 28–30

FRAMINGHAM, MASSACHUSETTS

This developer event covers the latest trends within the Java and JVM ecosystem. Scheduled are talks on Java 9, reactive APIs, and microservices. Team attendance is encouraged.

Emerging Technology Conference

OCTOBER 2–3

SAINT PAUL, MINNESOTA

This conference explores the emerging technologies that are shaping the world, including machine learning, blockchain, and virtual/augmented reality.

**DevOpsDays Detroit**

OCTOBER 3–4

DETROIT, MICHIGAN

DevOpsDays is a worldwide community conference series for anyone interested in information-technology improvement. This year marks its fourth annual iteration in Motor City.

KotlinConf

OCTOBER 3, WORKSHOPS

OCTOBER 4–5, CONFERENCE

AMSTERDAM, THE NETHERLANDS

This is the principal conference for the popular JVM language, Kotlin. Keynotes by Kotlin Project Lead Andrey Breslav and Purple Evolution CEO Alicia Carr are slated.

Desert Code Camp

OCTOBER 6

CHANDLER, ARIZONA

Desert Code Camp is a free, developer-based conference built on community content. This year's sessions include talks on serverless microservices and building a website with Angular.

JAX London

OCTOBER 8 AND 11, WORKSHOPS

OCTOBER 9–10, CONFERENCE

LONDON, ENGLAND

JAX London is a four-day conference for software engineers and enterprise-level professionals, bringing together the world's leading innovators in the fields of Java, microservices, continuous delivery, and DevOps. Topics

slated for this year include delivering new features in the JDK, developing Java applications on blockchain with web3j, and cloud-native Java with OpenJ9.

JCON

OCTOBER 9–11, CONFERENCE

OCTOBER 12, TRAINING

DÜSSELDORF, GERMANY

JCON is for professional Java developers interested in core Java, enterprise Java, frameworks, and microservices. Daily focus starts with cloud and DevOps, moves to big data, and finishes with architecture and agile. A parallel XDEVCON conference focuses on rapid cross-platform development.

re:develop

OCTOBER 12

BOURNEMOUTH, ENGLAND

This platform-agnostic developer conference returns after a one-year hiatus and will address key new methodologies and practical advice for approaching development projects more effectively.

JFuture

OCTOBER 13

MINSK, BELARUS

This event gathers Java developers, software engineers, and technology enthusiasts and will focus on major updates of Java and popular Java frameworks. Modularity, Spring, Kotlin, and Rust are slated topics.

Java Enterprise Summit

OCTOBER 17–19

DÜSSELDORF, GERMANY

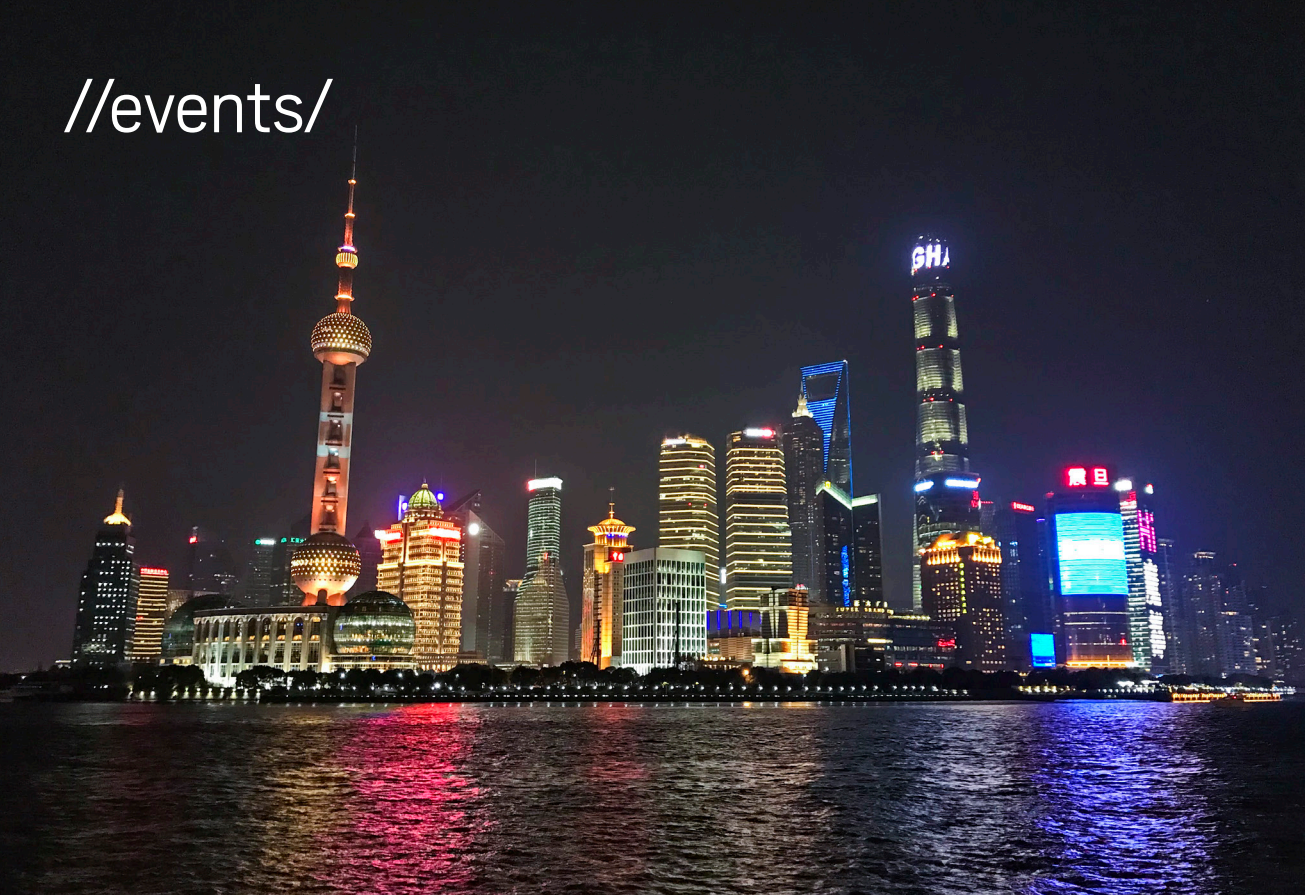
The Java Enterprise Summit is a Java EE training event exploring new paradigms such as microservices, API design, and state-of-the-art enterprise Java applications. (Website in German.)

All Things Open

OCTOBER 21–23

RALEIGH, NORTH CAROLINA

This annual conference explores open source, open tech, and the open web in the enterprise. Speakers this year include Netflix senior performance architect Brendan Gregg and AWS principal technologist Alolita Sharma. The theme this year is open source software and future disruption.

**KubeCon + CloudNativeCon**

NOVEMBER 13–15

SHANGHAI, CHINA

This conference gathers leading technologists from open source cloud-native communities to further the advancement of cloud-native computing. Simultaneous Mandarin-English translation will be provided for all keynotes and sessions.

Codemotion Berlin

NOVEMBER 20–21

BERLIN, GERMANY

Codemotion conferences are devoted to developers sharing the latest tech information and best practices among the tech community worldwide. Confirmed speak-

ers at this event include Picnic CTO Daniel Gebler and Apache Software Foundation member Kanchana Welagedara. The event is open to all languages and technologies and features coding lectures and workshops.

Topconf Tallinn

NOVEMBER 20–22

TALLINN, ESTONIA

Topconf Tallinn is an international software conference covering Java, open source, agile development, architecture, and new languages.

JVM-Con

NOVEMBER 27–28

COLOGNE, GERMANY

Among the topics slated for this conference devoted to JVM lan-

guages are the JRE, Java 9, Java EE 8, and cloud-native development. (Website in German.)

Codemotion Milan

NOVEMBER 29–30

MILAN, ITALY

Codemotion conferences are devoted to developers sharing the latest tech information and best practices among the tech community worldwide. Confirmed speakers at this event include Rogue Wave Senior Software Engineer Enrico Zimuel, ThoughtWorks Quality Analyst Wamika Singh, and Accenture Manager Maurizio Mangione. The event is open to all languages and technologies and features coding lectures and workshops.

DevTernity

NOVEMBER 30–DECEMBER 1

RIGA, LATVIA

The DevTernity forum covers the latest developments in coding, architecture, operations, security, leadership, and many other IT topics. Venkat Subramaniam, author of *Programming Concurrency on the JVM* and *Functional Programming in Java*, is slated to be one of the featured speakers.

ArchConf

DECEMBER 10–13

CLEARWATER, FLORIDA

ArchConf is an educational event for software architects, technical leaders, and senior developers presented by the No Fluff Just Stuff software symposium. Among the slated sessions are talks on applying design patterns, building serverless applications, machine learning, and scalable microservices.

CodeMash 2019

JANUARY 8–11, 2019

SANDUSKY, OHIO

CodeMash is an event that educates developers on current practices, methodologies, and technology trends in a variety of platforms and development languages such as Java, .NET, Ruby, Python, and PHP. The Java track features participation from many Java Champions.

Are you hosting an upcoming Java conference that you would like to see included in this calendar? Please send us a link and a description of your event at least 90 days in advance at javamag_us@oracle.com. Other ways to reach us appear on the last page of this issue.

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Few programming languages make it past 20 years and still retain high popularity. But Java has managed to remain widely used in many contexts because of its evolution—not just of the language, but of the larger direction of the ecosystem. None of this is clearer than in the advent of GraalVM, an ahead-of-time native compiler for Java code that coincidentally is written in Java and supports many other languages—both JVM-based and native. To understand how to use Graal for your own projects, see our article on [page 17](#).

Much of Java’s success comes from new tools contributed as open source. Hystrix from Netflix is an excellent library for assuring uptime in distributed apps—especially microservices. Our coverage of Hystrix ([page 37](#)) shows its benefits and elegance of implementation.

Finally, we look at one of the most exciting platform developments: running Java apps on power-sipping ARM processors. As our article ([page 54](#)) demonstrates, migration of existing code is not difficult, and on recent chip releases, it does not entail a compromise on performance.

We also include the next installment ([page 66](#)) of our series on design patterns, this time covering the Visitor pattern. And of course, this issue includes our usual quiz ([page 76](#)), editorial ([page 5](#)), and a book review ([page 8](#)) of an unusually interesting volume. Enjoy!



ART BY WES ROWELL


```
Context context = Context.create();
Value result = context.eval("js", "42");
assert result.asInt() == 42;
```

`Value` is how languages communicate with each other. Any Java object can be converted to a `Value` with the `Value.asValue(Object value)` method call, and the `Value` can be converted to its Java counterpart with `Value.as(Class<T> targetType)`. The exact description of the conversion process is outside the scope of this article, but the [API](#) always tries to do the sensible thing: it converts numbers to numbers, strings to Strings, values that can be executed to functional interfaces, collections to collections, and so on. For example, all of the following expressions are true:

```
context.eval("js", "'foobar'").as(String.class).equals("foobar");
context.eval("js", "{foo:'bar'}").as(Map.class).get("foo").equals("bar");
@FunctionalInterface interface IntFunction { int f(int value); }
context.eval("js", "(function(a){a})").as(IntFunction.class).f(42) == 42;
```

Armed with the **Context** and the **Value**, you can pass data between the components written in different languages.

However, a modern application will probably hide the details of the polyglot implementation of its components behind some abstraction. For example, this [demo application](#) is a Spring Boot web app that uses R to plot CPU utilization data as an SVG image.

In the app, the GraalVM polyglot context is defined as a Spring `@Bean`:

```
@Bean
public Context getGraalVMContext() {
    return Context.newBuilder().allowAllAccess(true).build();
}
```



In the next few sections, I cover how to obtain the libraries required to develop various services that will be used together to compose an example application. The individual services in the example application are actually separate projects that use only the EE4J projects that are required. In the end, I demonstrate how to deploy each of the services to a single instance of the “full” version of Payara Server to deliver the application. This setup can be used to deploy appli-



■ Listing 7: Configuring the monitoring application

```
@SpringBootApplication
@EnableHystrixDashboard
public class HystrixMonitorApplication {

    public static void main(String[] args) {
        SpringApplication.run(HystrixMonitorApplication.class, args);
    }
}
```

Here, the annotation that enables the Hystrix dashboard does the trick. Run the services and paste the stream URL (<http://localhost:8088/hystrix.stream>) into the Hystrix dashboard application (at <http://localhost:8078/hystrix/>), as shown in **Figure 1**.

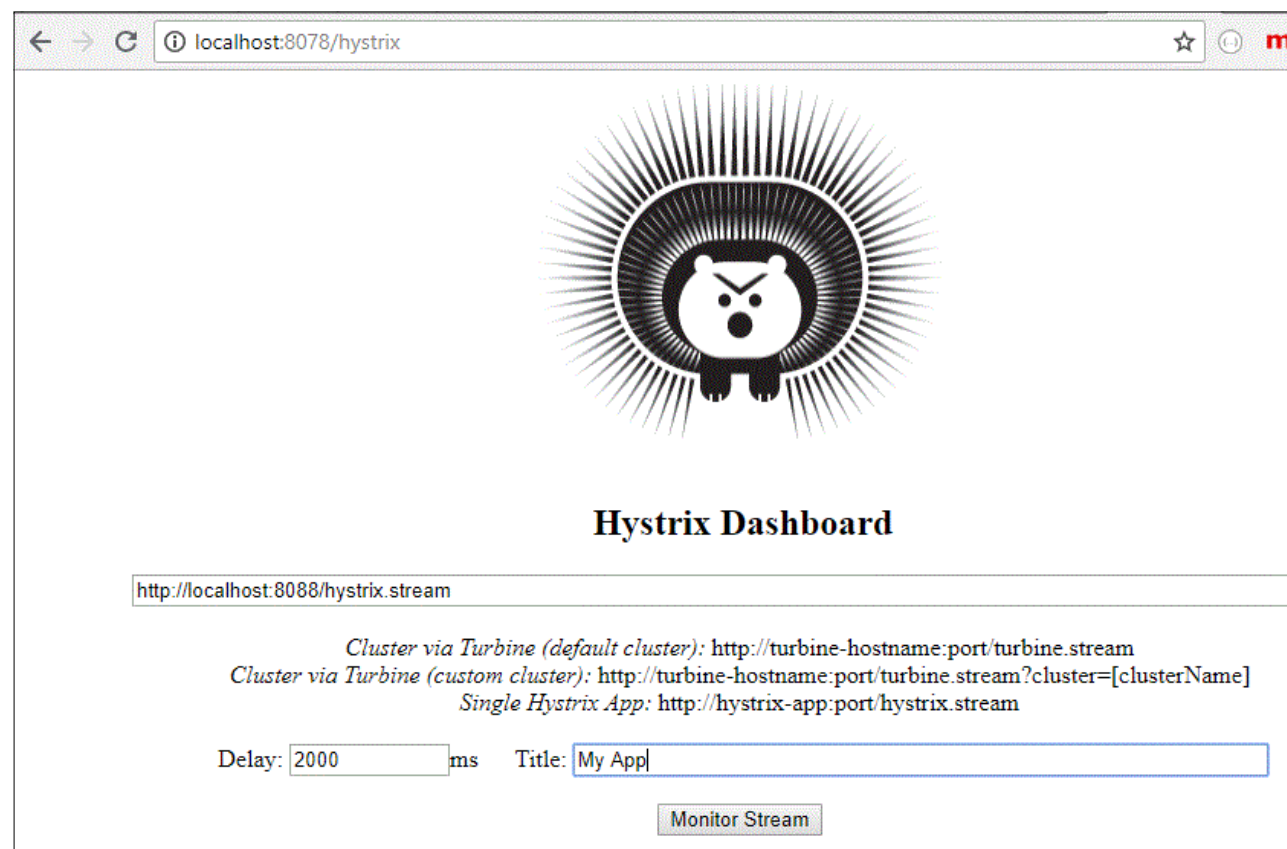


Figure 1: Hystrix dashboard application



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Ian Darwin (@Ian_Darwin) has done all kinds of development, from mainframe applications and desktop publishing applications for UNIX and Windows, to a desktop database application in Java, to healthcare apps in Java for Android. He's the author of *Java Cookbook* and *Android Cookbook* (both from O'Reilly). He has also written a few courses and taught many at Learning Tree International.

In Java, all arguments to method calls are pass by value. That is, the value of the argument variable is copied into a new variable for use by the method. However, the value of a variable of object type is itself a *reference*, so the method has access to the original object through that reference.

Question 3
page 78

Answer 3. The correct answer is option E. The exam objectives include determining whether exam takers have knowledge of several elements of the Collections API, including the `TreeSet`. Two things are significant in the word `TreeSet`. A Set rejects duplicate entries, but in this question no duplicates are offered. The second thing is that a tree structure facilitates fast data searches by putting the data items in locations based on their order. For this to happen, there must be an order associated with the items being stored.

In a Java `TreeSet`, this ordering is determined when the collection is initially built, and it can be supplied in either of two ways:

- Using the natural order of the items. A “natural order” is defined in the Java API documentation as being the order implicit in the object’s implementation of the `java.lang.Comparable` interface. The `Item` class in this question does not implement that interface.
- Using an externally provided ordering. Such an order is provided via an implementation of the `java.lang.Comparator` interface. As already mentioned, the order is determined at the time the collection is constructed; therefore, the comparator must be supplied as a constructor argument. In this example, no such argument is provided.

Because neither of the options for specifying order is used in this question, the tree cannot work properly. So, how might this failure be visible?

There are three possibilities: the code doesn't compile, the code fails to store items in a rapidly retrievable way (perhaps storing them randomly and then failing to find them), or an exception is thrown. In fact, after a `TreeSet` has been created without a `Comparator` to use for ordering, any attempt to add an object that does not implement the `Comparable` interface will cause the `TreeSet.add` method to throw a runtime exception. Because of this, option E is correct.

Let's examine the background for some of the other options.

Clearly, if `TreeSet` is expected to put items into order, then option A is tempting, because it

