From ‘Java Sucks’ to ‘Java…Eh, Not Bad’

How Vert.x & Java 21 Made Me Stop Complaining

Thomas Gebert

Who Am I?

- Software Engineer in New York City.

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- There is nothing else interesting about me.

Java.

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```
public class DeadlockExample {
  public void thread1() {
    synchronized (lockA) {
      sleep(100);
      synchronized (lockB) {
        System.out.println("Thread 1: Holding lockB");
      }
    }
  }

  public void thread2() {
    synchronized (lockB) {
      sleep(100);
      synchronized (lockA) {
        System.out.println("Thread 2: Holding lockA");
      }
    }
  }
```

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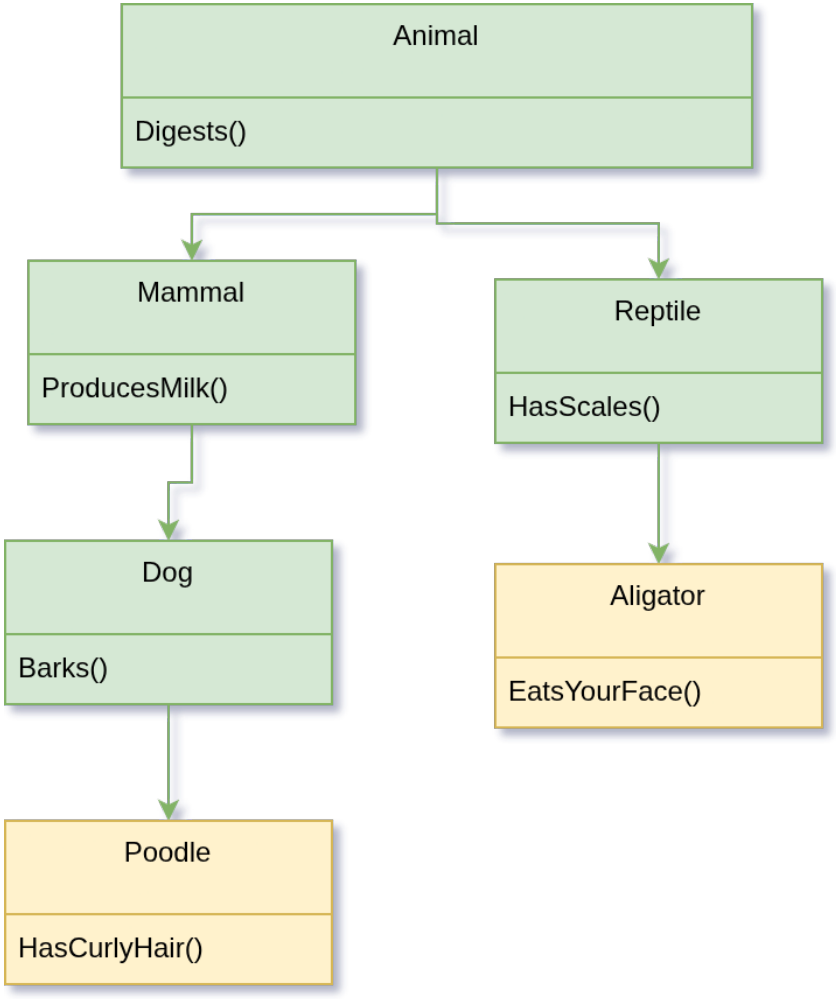

Storytime.

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ColdFusion
Programming
Language

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- (Can be) fast.

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- Many companies will find it infeasible to migrate to a better language, and would rather spend infinitely more money hiring dozens of engineers to write a million incrementatal patches to a Java codebase.
- Many of us are stuck in this hell.

Modern Java

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Java 8 and 11 New features

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```
int count = 0;
for (String word : words) {
  if (word.length() > 10) {
    count++;
  }
}
System.out.println("Long words: " + count);
```

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```

```
long count = words.stream()
                  .filter(w -> w.length() > 10)
                  .count();

System.out.println("Long words: " + count);
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public interface Greeter {
  void greet(String name);

  default void greetPolitely(String name) {
    System.out.println("Hello, " + name + ". It's nice to m
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BlockingQueue (java.util.concurrent)

- A thread-safe queue that blocks on `put` and `take` operations
- Useful for producer-consumer patterns
- Comes in several flavors: `ArrayBlockingQueue`, `LinkedBlockingQueue`, `PriorityBlockingQueue`, etc.

Old Underutilized Java Feature

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```
BlockingQueue<String> queue = new LinkedBlockingQueue<>();

// Producer
new Thread(() -> {
    queue.put("data");
}).start();

// Consumer
new Thread(() -> {
    String item = queue.take();
}).start();
```

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Pre-virtual-threads

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```
ExecutorService executor = Executors.newFixedThreadPool(4);

for (int i = 0; i < 10; i++) {
  int taskId = i;
  executor.submit(() -> {
    System.out.println("Running task " + taskId +
                       " on thread " + Thread.currentThread
  });
}

executor.shutdown();
```

Pre-virtual-threads

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Pre-virtual-threads

- Worked ok, but could break if you did any kind of blocking IO.
- Did not properly park IO blocking.

New Executors

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```
Executors.newVirtualThreadPerTaskExecutor()
```

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Before Records

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```
public class Point {
  private final int x;
  private final int y;

  public Point(int x, int y) {
    this.x = x;
    this.y = y;
  }

  public int x() { return x; }
  public int y() { return y; }

  @Override
  public boolean equals(Object o) {
    if (this == o) return true;
    if (!(o instanceof Point)) return false;
    Point p = (Point) o;
    return x == p.x && y == p.y;
```

Sealed Interfaces

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```
public interface Shape {}

public class Circle implements Shape {
  public final double radius;
  public Circle(double radius) { this.radius = radius; }
}

public class Rectangle implements Shape {
  public final double width, height;
  public Rectangle(double w, double h) {
    this.width = w;
    this.height = h;
  }
}
```

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Before pattern matching.

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```
public void handle(Object obj) {
  if (obj instanceof String) {
    String s = (String) obj;
    System.out.println("String length: " + s.length());
  } else if (obj instanceof Integer) {
    Integer i = (Integer) obj;
    System.out.println("Squared: " + (i * i));
  } else {
    System.out.println("Unknown type");
  }
}
```

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Verticle

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- Deployed with `vertx.deployVerticle(...)`

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Event Loop

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- Designed for minimal context switching and high throughput

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Event Bus

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```
void doSomethingAsync(Promise<String> promise) {
  vertx.setTimer(500, id -> {
    promise.complete("Hello, future!");
  });
}
```

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SharedData

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- Data is paused/resumed automatically when the receiver can’t keep up
- Useful when handling large streams (e.g., file uploads, HTTP bodies)

Backpressure in Vert.x

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Example: Handling a slow WriteStream

```
source.pipeTo(slowSink, res -> {
  if (res.succeeded()) {
    System.out.println("All data written.");
  } else {
    res.cause().printStackTrace();
  }
});
```

Vert.x distributed concurrency example

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Deploying Verticles: Local vs Clustered

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```
public class MyVerticle extends AbstractVerticle {

  @Override
  public void start(Promise<Void> startPromise) {
    System.out.println("Verticle started on thread: " + Thr

    vertx.setTimer(1000, id -> {
      System.out.println("Timer fired after 1 second");
    });

    startPromise.complete();
  }
}
```

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Local Deployment

```
Vertx vertx = Vertx.vertx();
vertx.deployVerticle(new MyVerticle());
```

Vert.x Concurrency Example.

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Distributed Deployment

Vert.x Concurrency Example.

Distributed Deployment

```
Vertx.clusteredVertx(new VertxOptions(), res -> {
  if (res.succeeded()) {
    Vertx vertx = res.result();
    vertx.deployVerticle(new MyVerticle());
  } else {
    res.cause().printStackTrace();
  }
});
```

RxJava

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- Gives us functional patterns for reactive applications.

RxJava: Basics of Reactive Programming

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- Core idea: data flows over time, like a stream
- Common building block: `Observable<T>`

Creating an Observable

Creating an Observable

```
Observable<String> source = Observable.just("Alpha", "Beta"

Observable<Integer> lengths = source
  .map(str -> str.length())
  .filter(len -> len >= 5);
```

Creating an Observable

Creating an Observable

```
lengths.subscribe(
  item -> System.out.println("Received: " + item),
  error -> System.err.println("Error: " + error),
  () -> System.out.println("Stream complete")
);
```

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Conclusion.

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- Java 21 isn’t that bad.

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- Java 21 isn’t that bad.
- Convince your employers to upgrade if you want to reclaim your sanity.
- Blah . . .
- Use libraries like Vert.x and Disruptor to make life simpler.

Conclusion.

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