# Integration Testing with Testcontainers

*Martin Nachev*

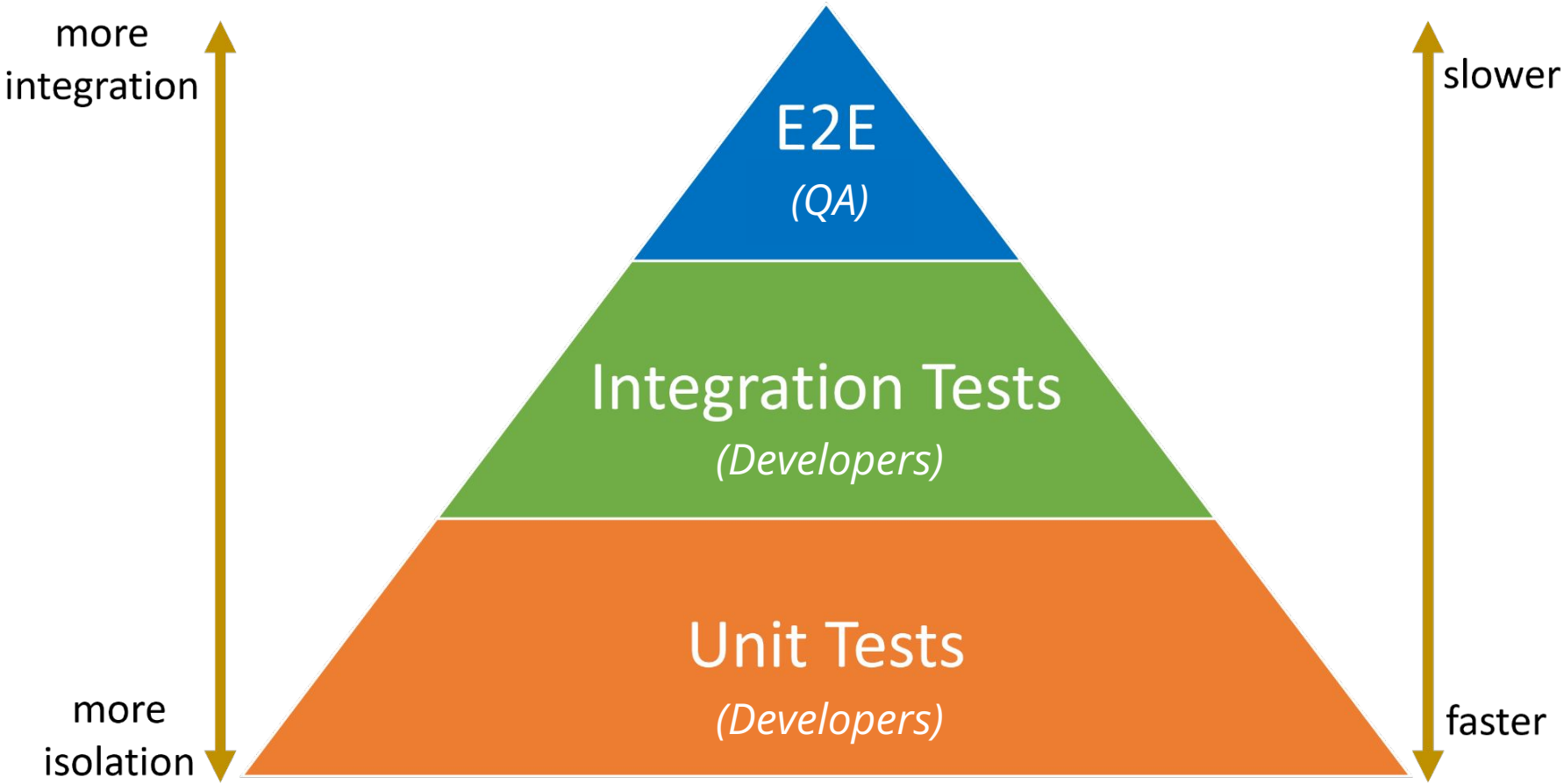
*Engineering Manager*

personal programmer

propeller

# Who here writes tests?

# Who here likes maintaining tests?


more integration
more isolation
E2E
(QA)
Integration Tests
(Developers)
Unit Tests
(Developers)
slower
faster

# Why Integration Tests

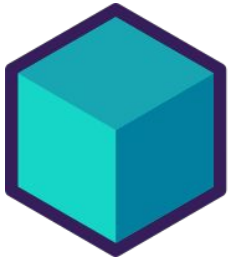
- We make CRUD apps
  - DBs queries contain most of the important logic and performance risk
- Mocking everything tests nothing
  - Mocks make hard-to–maintain tests especially when refactoring

- But integrations tests are slower than unit tests, so don’t overdo it
  - Do not use them for things like validations or pure functions

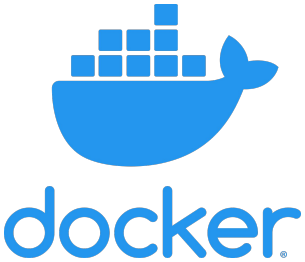
# The problem of running today's apps

- Cloud-native infrastructure & microservices
  - First run the **correct version** of **MySQL**, then of **Redis**, then of **Kafka** and **Service B** every single time...
  - ... or use mocks/in-memory services that won't act like the real thing
  - ... or connect to Cloud environment's instances
  - ... and make sure there's no existing corrupted data
  - ... and only then you run/test **your service locally** or **your tests in CI**

# Testcontainers



# Testcontainers




- Bootstrap dependencies (DBs, MQs, Services…) with Docker containers
- No more need for mocks/in-memory services or complicated env setups
  - Test/Run using the exact same services you use in production
    - No "it works on my machine" issues
- Automatic cleanup & teardown with Ryuk sidecar container
- Port randomization for parallel test execution

# Supported Languages


Java


Go

.NET


Node.js


Python


Rust


Haskell


Ruby

# Packages/Modules

testcontainers *(GenericContainer)*

@testcontainers/postgresql

@testcontainers/elasticsearch

@testcontainers/kafka

@testcontainers/mongodb

@testcontainers/mysql

@testcontainers/nats

@testcontainers/neo4j

@testcontainers/redis

@testcontainers/gcloud

@testcontainers/couchbase

@testcontainers/arangodb

@testcontainers/hivemq

@testcontainers/mssqlserver

...

# Setup and example NestJS project

```
npm i testcontainers
```

```
@Module({
 imports: [
   ConfigModule.forRoot({ load: [() => ({ dbUri: process.env.DB_URI })] }),
   MongooseModule.forRootAsync({
     imports: [ConfigModule],
     inject: [ConfigService],
     useFactory: configService => ({ uri: configService.get<string>("dbUri") }),
   }),
   JediModule,
 ],
})
export class AppModule {}
```

# Testing with Jest

```
describe("MongoDB App Test", () => {
 let container: StartedTestContainer;
 // ...
 beforeAll(async () => {
   container = await new GenericContainer("mongo:6").withExposedPorts(27017).start();
   process.env.DB_URI = `mongodb://localhost:${container.getMappedPort(27017)}/jedi`;
   // ...
 });

 afterAll(async () => {
   await container.stop();
   // ...
 });

 it("tests something", async () => {
   // ...
 });
```

# Running a NestJS app locally

```
// src/main.ts
async function bootstrap() {
 let container;
 if (!process.env.DB_URI) {
   container = await new GenericContainer("mongo:6").withExposedPorts(27017).start();
   process.env.DB_URI = `mongodb://localhost:${container.getMappedPort(27017)}/jedi`;
 }

 const app = await NestFactory.create(AppModule);
 await app.listen(3000);
}

bootstrap();
```

# Using Docker Compose

```
// docker-compose.yaml
services:
 mongo:
   image: "mongo:6"
   ports:
     - "27017:27017"
```

```
// src/main.ts
async function bootstrap() {
 if (!process.env.DB_URI) {
   await new DockerComposeEnvironment(
     ".",
     "docker-compose.yaml")
     .up();
   process.env.DB_URI =
     `mongodb://localhost:27017/jedi`;
 }

 const app = await NestFactory.create(AppModule);
 await app.listen(3000);
}

bootstrap();
```

# Demo

# Questions?

personal
programmer

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