Integration Testing with Testcontainers

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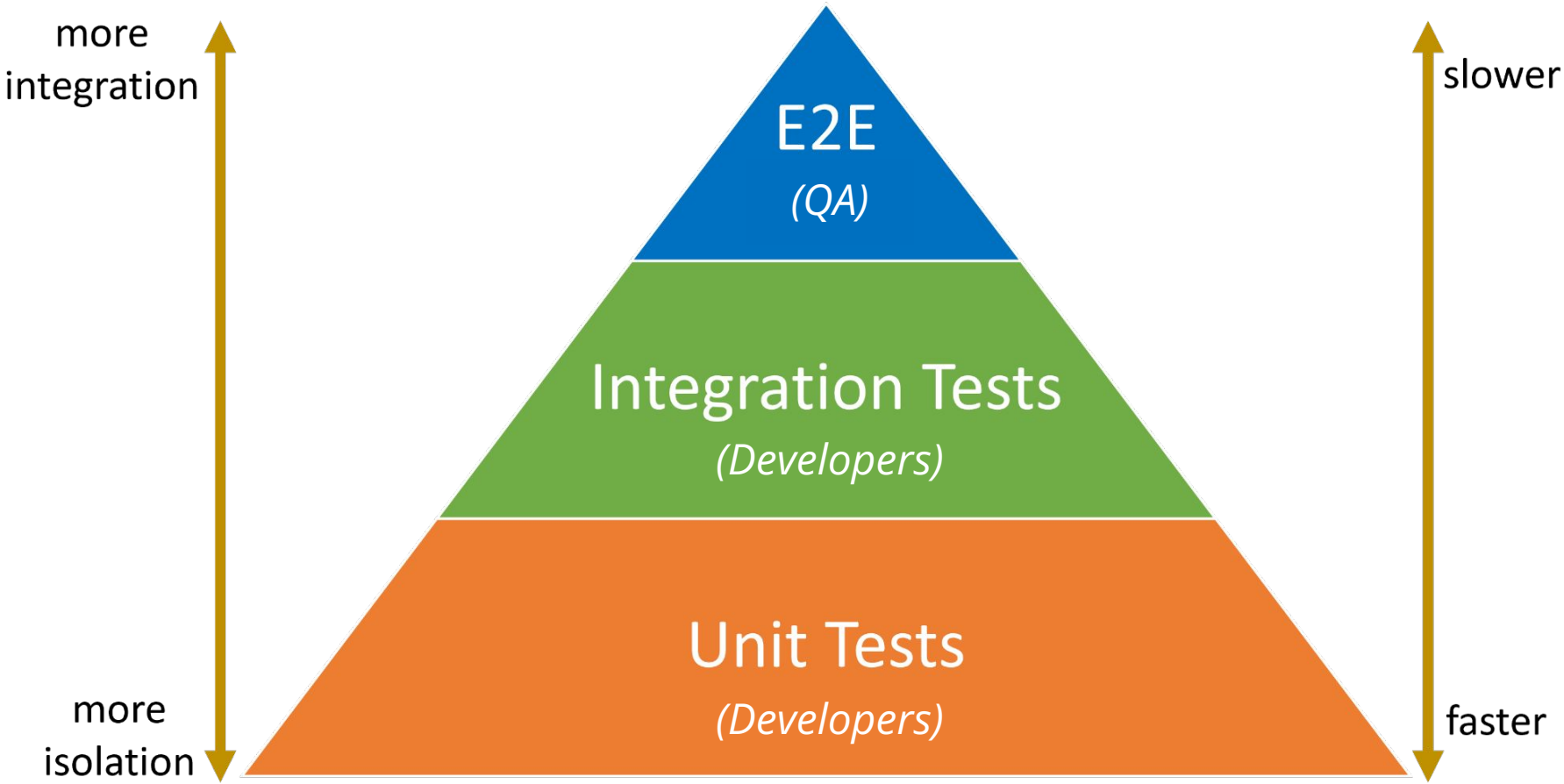
Who here writes tests?

Who here likes maintaining tests?


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

Why Integration Tests

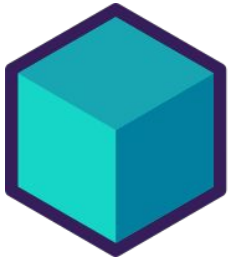
- We make CRUD apps
  - DBs queries contain most of the important logic and performance risk
- Mocking everything tests nothing
  - Mocks make hard-to–maintain tests especially when refactoring

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

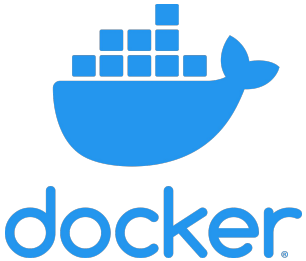
The problem of running today's apps

- Cloud-native infrastructure & microservices
  - First run MySQL, Redis, 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 in CI

Testcontainers



Testcontainers



- Bootstrap dependencies with Docker containers
- Test/Run using the exact same services you use in production
- Port randomization for parallel test execution
- Automatic cleanup & teardown with Ryuk sidecar container

- Languages: **Node.js**, Java, .NET, Go, Python, Rust, Haskell, Ruby
- Modules: **GenericContainer**, MongoDB, MySQL, Elasticsearch, Kafka etc.

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)}`;
   // ...
 });

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

 it("should do 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?

https://github.com/nachevm/integration-testing-with-testcontainers

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