Quanos
Solutions

Indiana Codes and the holy grail of software development

26.04.2023 / INVisionDay 2023 @ TH Nürnberg / Marcel Piontek

What we will do together

SUBJECT	ANSWERS FOLLOWING QUESTIONS:
introduction and overview	Who is this dude? What are we going to build? Which technology should I use?
local development	How do we get this to work locally? How do we insert test data? How do we develop new features?
cluster deployment	How do we get this to work in a Kubernetes cluster?
wrap up	Please, let this end…

Who is this dude?

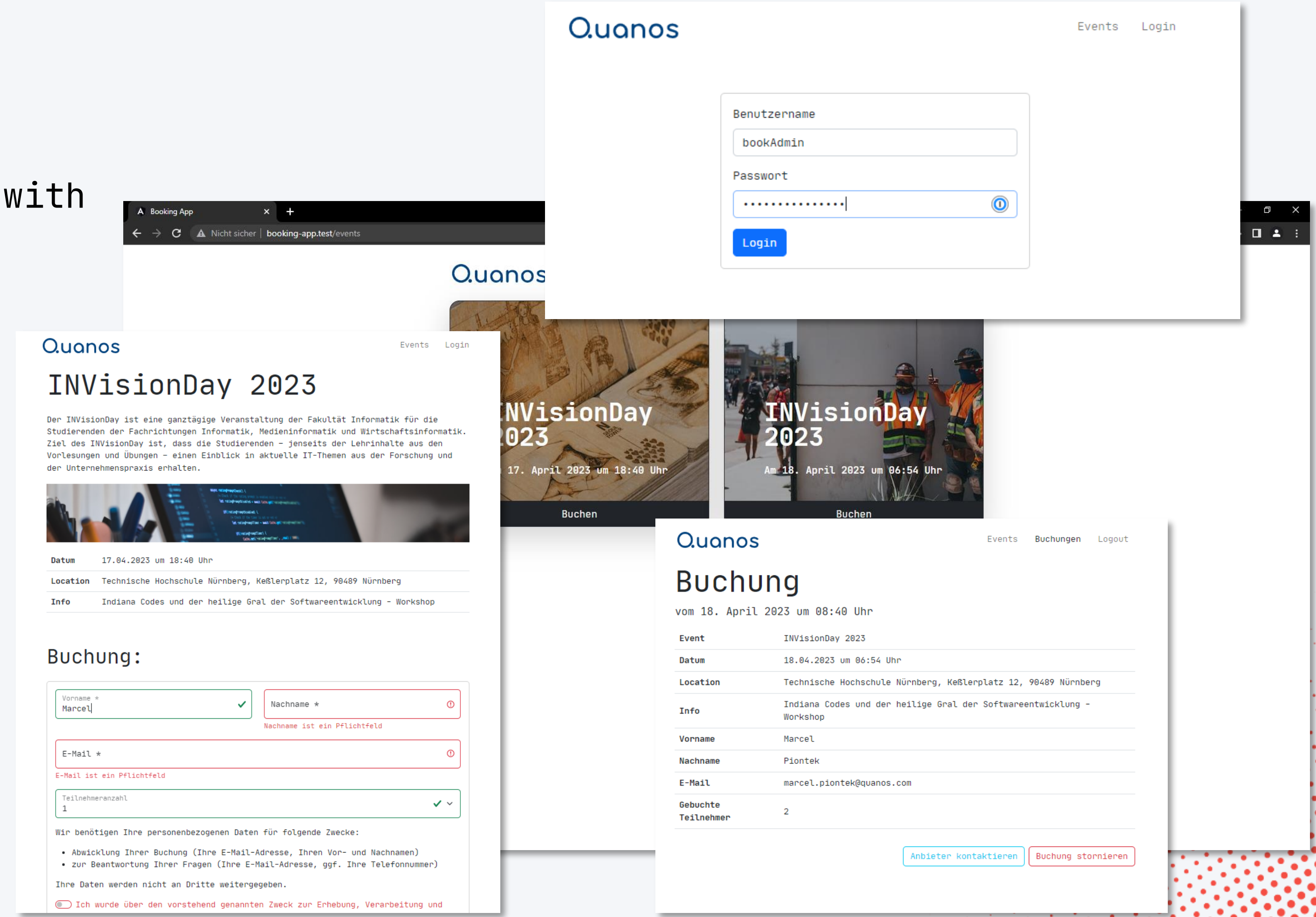
Marcel Piontek

- emerging cloud architect
- senior software developer with heart and soul
- agilist and certified ScrumMaster® with passion
- father, gaming & music

- 2008 - 2014: Bachelor- and Masters-Degree in Medical Informatics (Ruprecht-Karls-Universität Heidelberg/Hochschule Heilbronn)
- 2014 - 2020: IT-Consultant, Senior IT-Consultant @ several companies
- 2017 - today: Freelancer @ MP IT Performance, Heilbronn
- 2020 - today: Senior Software Developer @ Quanos, Nürnberg

What are we going to build and why?

- ticketsystem
- typical web application with
  - database
  - middleware/api
  - frontend
- each artifact designed as a microservice
- middleware/api is a miniservice ☺ why?
- how do we build this?



Benutzername
bookAdmin
Passwort
•••••••••••••••

INVisionDay 2023

Der INVisionDay ist eine ganztägige Veranstaltung der Fakultät Informatik für die Studierenden der Fachrichtungen Informatik, Medieninformatik und Wirtschaftsinformatik. Ziel des INVisionDay ist, dass die Studierenden – jenseits der Lehrinhalte aus den Vorlesungen und Übungen – einen Einblick in aktuelle IT-Themen aus der Forschung und der Unternehmenspraxis erhalten.

Datum	17.04.2023 um 18:40 Uhr
Location	Technische Hochschule Nürnberg, Keßlerplatz 12, 90489 Nürnberg
Info	Indiana Codes und der heilige Gral der Softwareentwicklung - Workshop

Buchung:

Vorname * Marcel ✓

Nachname * ⓘ
Nachname ist ein Pflichtfeld

E-Mail * ⓘ
E-Mail ist ein Pflichtfeld

Teilnehmeranzahl 1 ✓

Wir benötigen Ihre personenbezogenen Daten für folgende Zwecke:

- Abwicklung Ihrer Buchung (Ihre E-Mail-Adresse, Ihren Vor- und Nachnamen)
- zur Beantwortung Ihrer Fragen (Ihre E-Mail-Adresse, ggf. Ihre Telefonnummer)

Ihre Daten werden nicht an Dritte weitergegeben.

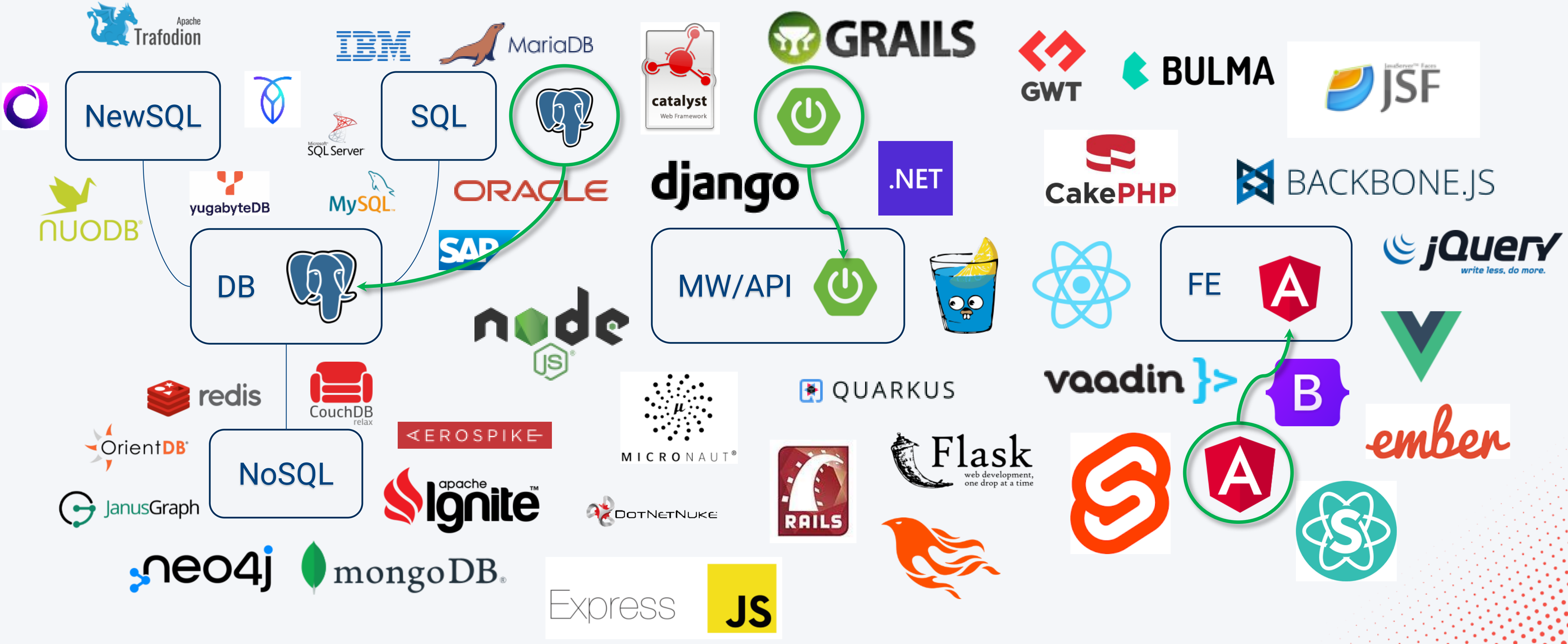
○ Ich wurde über den vorstehend genannten Zweck zur Erhebung, Verarbeitung und

Buchung

vom 18. April 2023 um 08:40 Uhr

Event	INVisionDay 2023
Datum	18.04.2023 um 06:54 Uhr
Location	Technische Hochschule Nürnberg, Keßlerplatz 12, 90489 Nürnberg
Info	Indiana Codes und der heilige Gral der Softwareentwicklung - Workshop
Vorname	Marcel
Nachname	Piontek
E-Mail	marcel.piontek@quanos.com
Gebuchte Teilnehmer	2

Which technology should I use?



NewSQL

SQL

DB

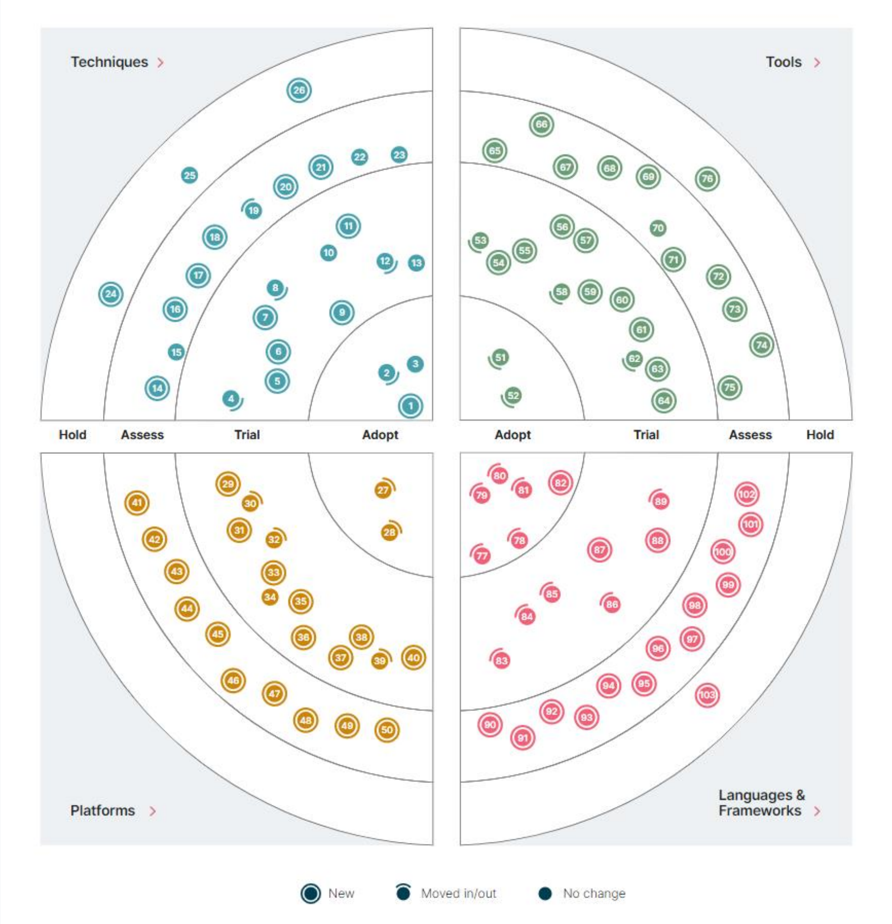
NoSQL

MW/API

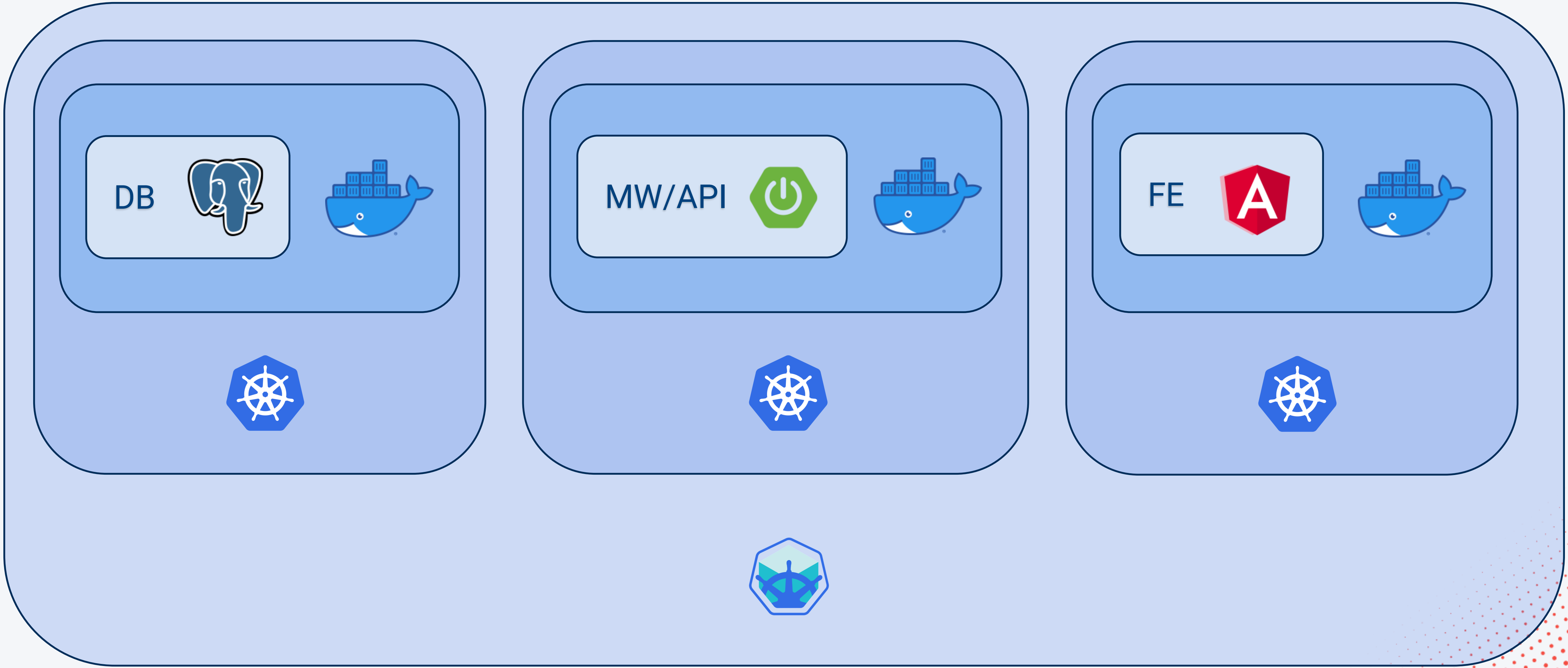
FE

New technology hypes everywhere

- new techniques, new tools, new languages & frameworks and new platforms every day/week/month
- several companies try to clear the jungle e.g. https://www.thoughtworks.com/de-de/radar
- they inspect new technologies and make suggestions which to adopt



What are we going to build and why?



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Setup

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Digression: Docker

- what is docker?

- docker is a set of free platform as a service products to isolate applications with the help of container virtualization.

- why do we want to use it?

- docker simplifies the deployment of applications because the containers include all needed packages and dependencies.

Checkout and initialize the database

1. git clone https://github.com/marcelpiontek/booking-app.git
2. cd booking-app
3. cd booking-db
4. cp env.example .env
5. docker-compose up -d --build (docker desktop needed)
6. to verify container running: docker ps
7. open „Visual Studio Code“
8. open folder „<your-workspaces>/booking-app“
9. optional: install extensions

Checkout and initialize the middleware/api

1. git clone https://github.com/marcelpiontek/booking-mw.git
2. cd booking-mw
3. open „IntelliJ Idea“ (Community Editon or Ultimate)
4. open <your-workspaces>/booking-mw

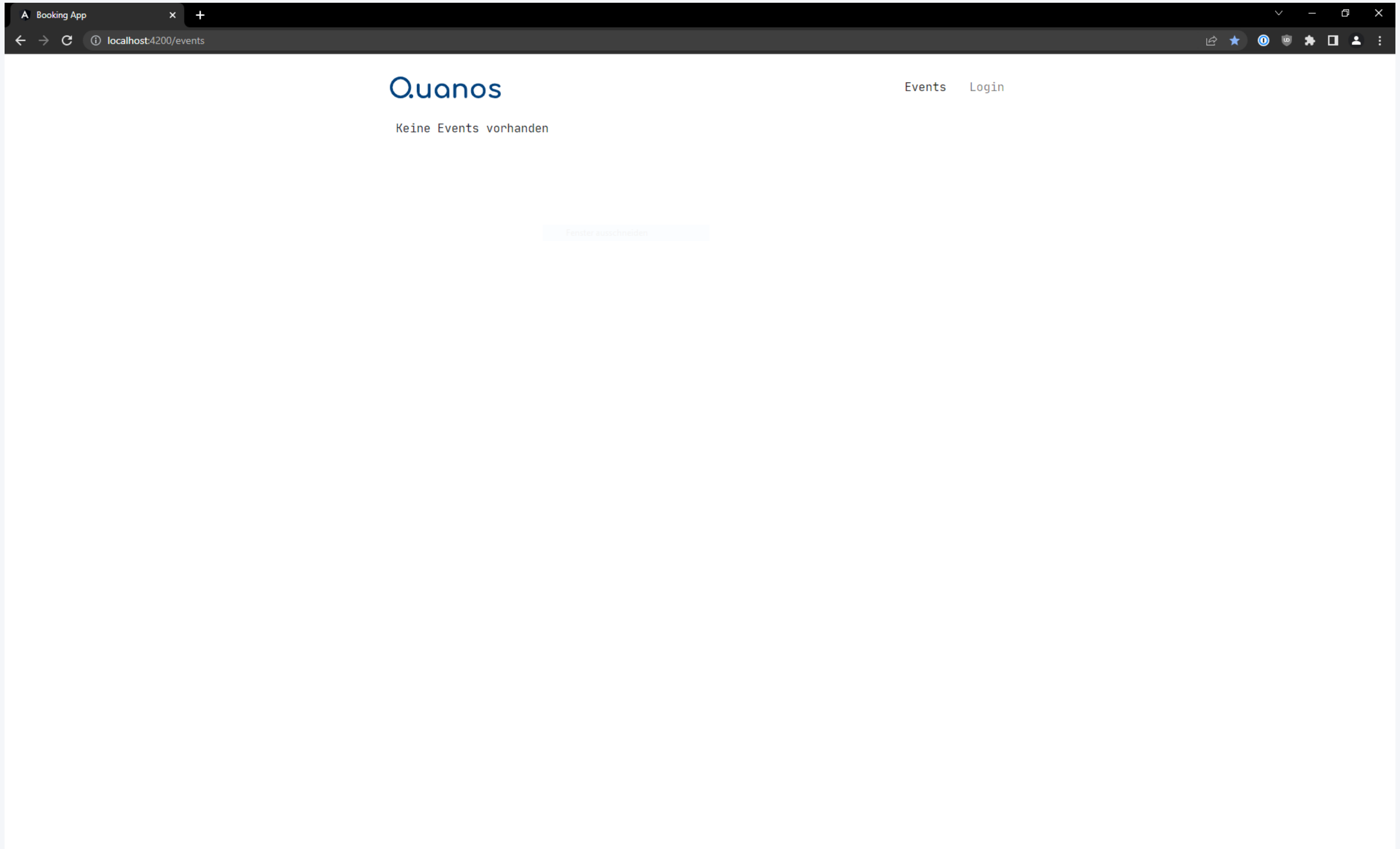
   IntelliJ Idea should automatically detect a maven project and create a run configuration.
   Lombok needs annotation processing:
   Settings > Build, Execution, Deployment > Annotation Processors > Enable

5. run „BookingMwApplication“

Checkout and initialize the frontend app

1. git clone https://github.com/marcelpiontek/booking-fe.git
2. cd booking-fe
3. npm install
4. optional: npm install -g @angular/cli
5. ng serve (with angular-cli) / npm run start
6. open browser on „http://localhost:4200“
7. open „Visual Studio Code“
8. open folder „<your-workspaces>/booking-fe“
9. optional: install extensions

Setup - Result



Keine Events vorhanden

Challenge One

Add an event on app start-up

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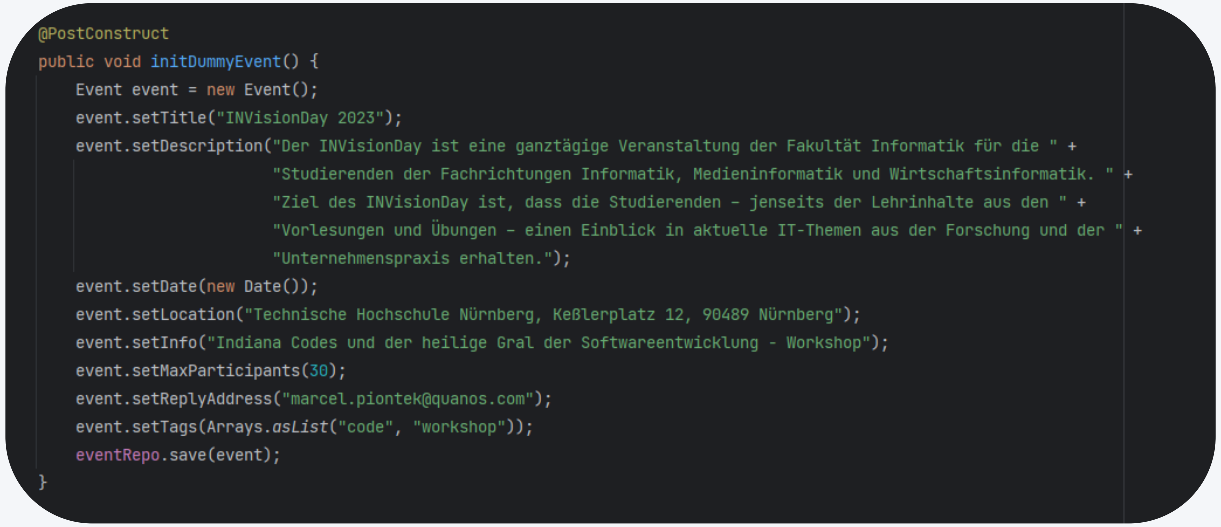
Challenge One

- Solution 1 (programmatically)
  - add method in „EventService“ > „initDummyEvent()“
    → checkout branch „feature/challenge-one in repository „booking-mw“

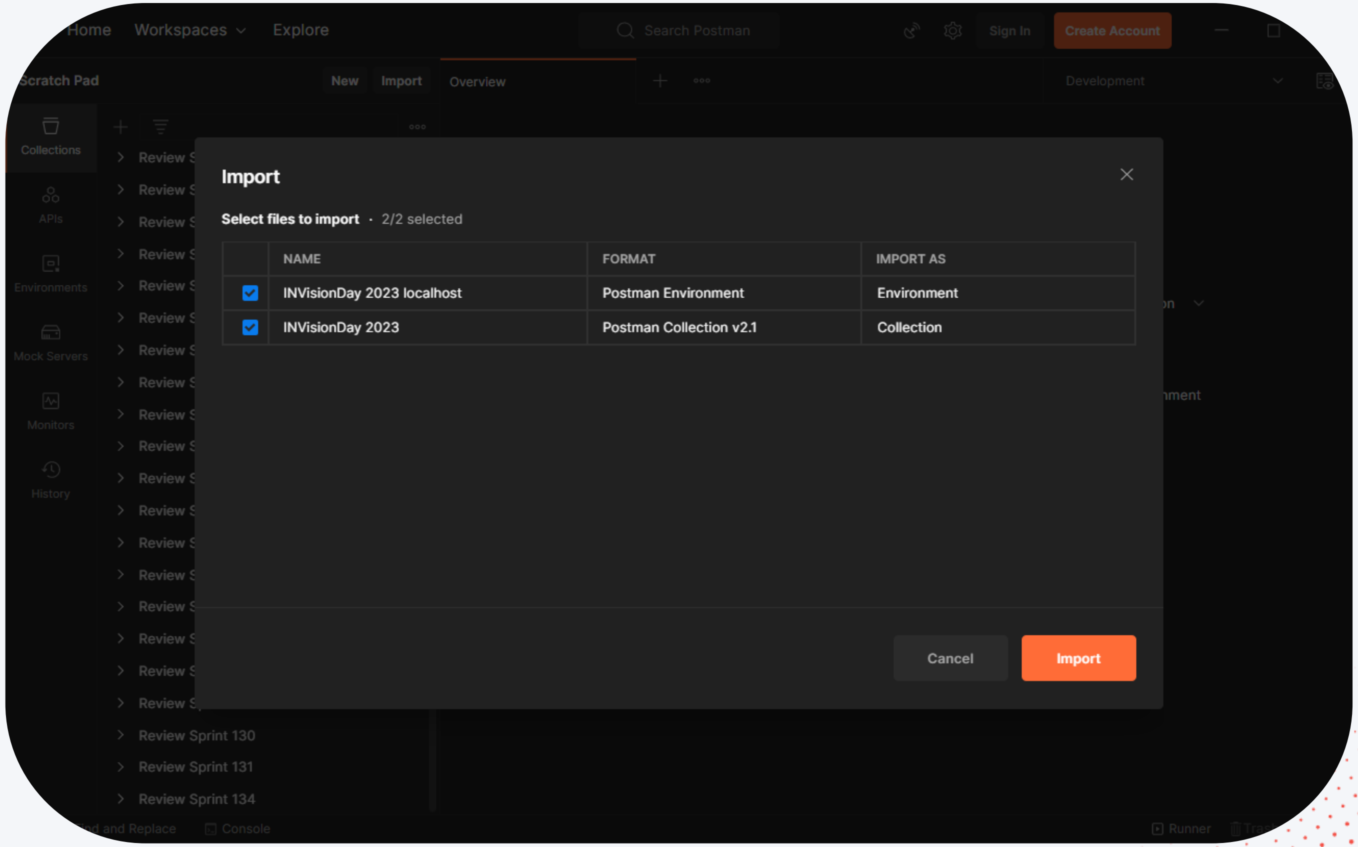


```java
@PostConstruct
public void initDummyEvent() {
    Event event = new Event();
    event.setTitle("INVisionDay 2023");
    event.setDescription("Der INVisionDay ist eine ganztägige Veranstaltung der Fakultät Informatik für die " +
                         "Studierenden der Fachrichtungen Informatik, Medieninformatik und Wirtschaftsinformatik. " +
                         "Ziel des INVisionDay ist, dass die Studierenden – jenseits der Lehrinhalte aus den " +
                         "Vorlesungen und Übungen – einen Einblick in aktuelle IT-Themen aus der Forschung und der " +
                         "Unternehmenspraxis erhalten.");
    event.setDate(new Date());
    event.setLocation("Technische Hochschule Nürnberg, Keßlerplatz 12, 90489 Nürnberg");
    event.setInfo("Indiana Codes und der heilige Gral der Softwareentwicklung - Workshop");
    event.setMaxParticipants(30);
    event.setReplyAddress("marcel.piontek@quanos.com");
    event.setTags(Arrays.asList("code", "workshop"));
    eventRepo.save(event);
}
```

- Solution 2 (manually via Postman)
  - See digression on next slide

Digression: Postman

- start „Postman“
- import „Folder“
- select „Postman“ folder in repository „booking-app“
- import
- select „POST events“ request and send
- select „GET events“ request and send to verify



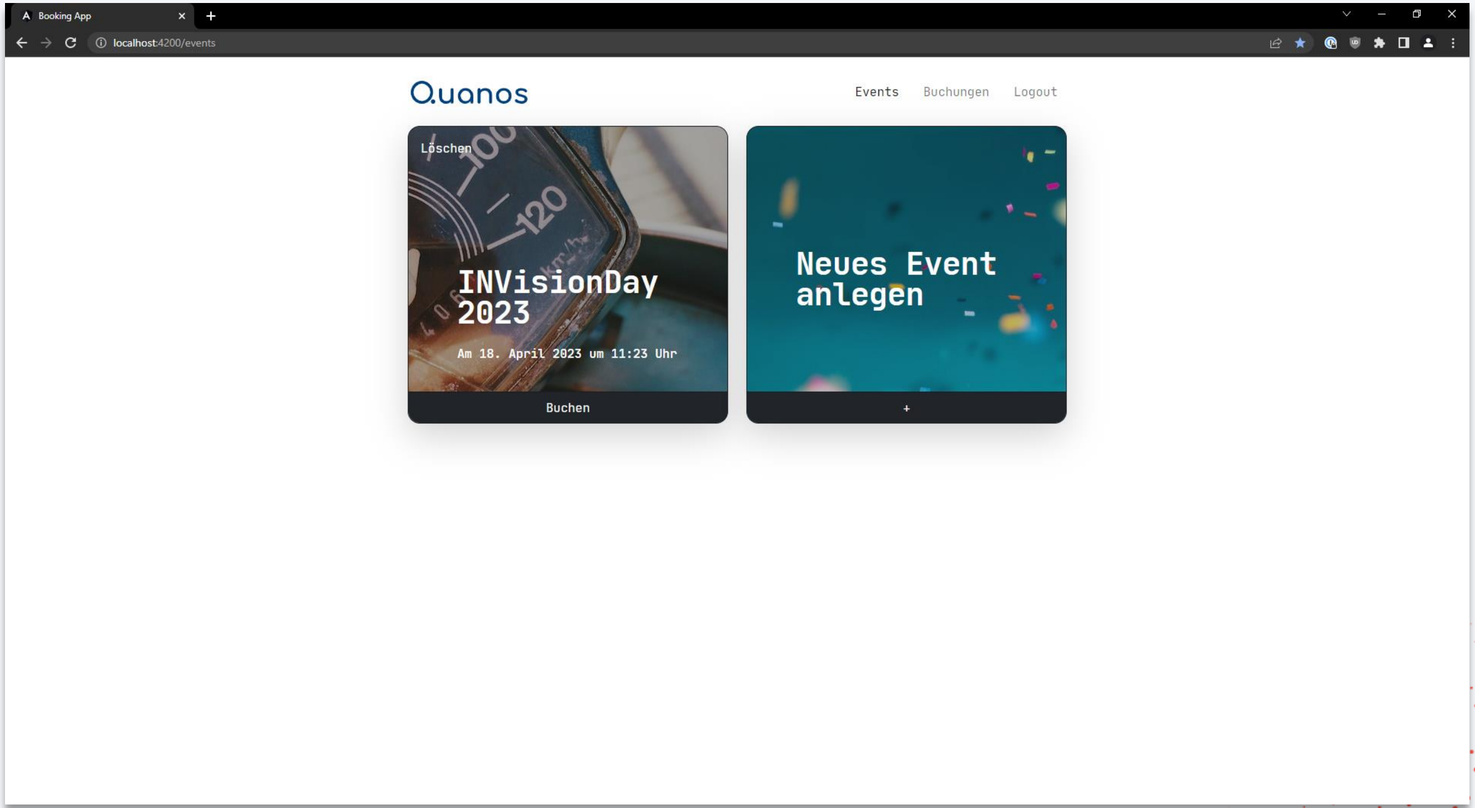
Import

Select files to import · 2/2 selected

	NAME	FORMAT	IMPORT AS
☑	INVisionDay 2023 localhost	Postman Environment	Environment
☑	INVisionDay 2023	Postman Collection v2.1	Collection

Challenge One - Result

- booking-app
  - checkout branch: master
- booking-mw
  - checkout branch: feature/challenge-one
- booking-fe
  - checkout branch: master



Challenge Two

Make all bookings visible

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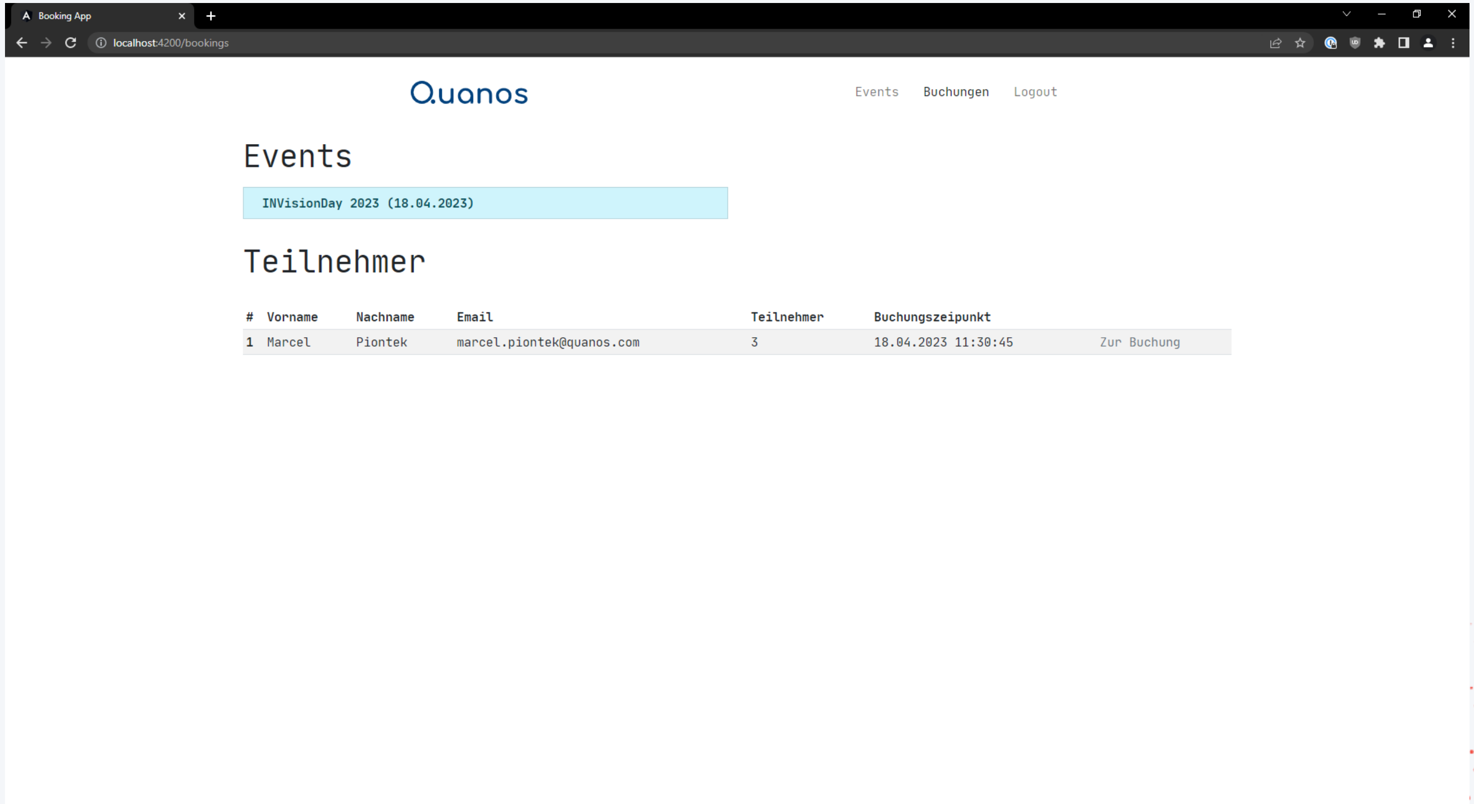
Challenge Two – Live coding

- tune frontend
  - new table and click-feature in booking-overview.component.html
  - new business logic in booking-overview.component.ts
  - new method to get bookings by event id in booking.service.ts
  - rebuild

- tune middleware/api
  - new request mapping in controller
  - new query method in booking repo
  - rebuild

Challenge Two - Result

- booking-app
  - checkout branch: master
- booking-mw
  - checkout branch: feature/challenge-two
- booking-fe
  - checkout branch: feature/challenge-two



Events

INVisionDay 2023 (18.04.2023)

Teilnehmer

#	Vorname	Nachname	Email	Teilnehmer	Buchungszeipunkt	
1	Marcel	Piontek	marcel.piontek@quanos.com	3	18.04.2023 11:30:45	Zur Buchung

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Challenge Three

Deploy the application to Minikube

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Digression: Kubernetes

- what is kubernetes?
- Kubernetes (k8s) is an open-source system for automating the deployment, scaling and management of containerized applications.
- why do we want to use it?
- we do not want to administrate thousands of microservices manually.
- when do we want to use it?
- if we want to use a microservice architecture
- let‘s look into the configuration files together!

Digression: Minikube

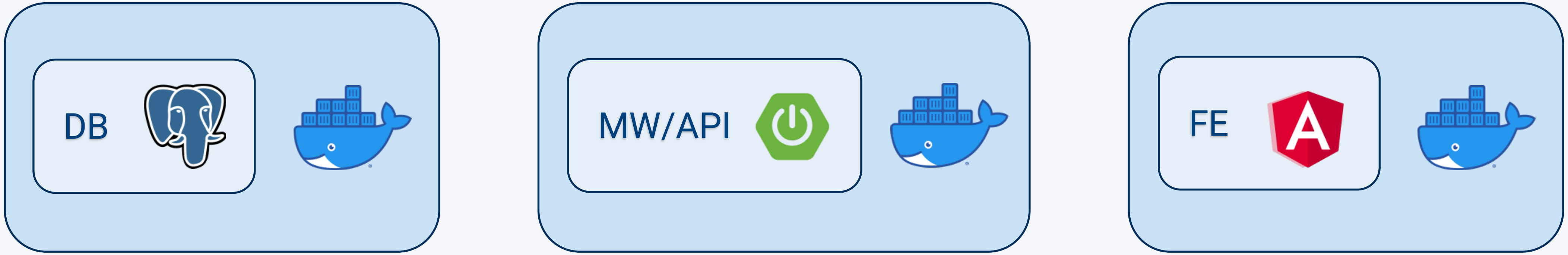
• what is minikube?	• minikube is a local kubernetes cluster with a single node
• why do we want to use it?	• we want to learn and develop web applications for kubernetes
• when do we want to use it?	• for developent and testing purposes

Challenge Three

- stop database
  - go to Terminal -> docker-compose down
- stop frontend
  - go to „Visual Studio Code“-Terminal -> ctrl + c
- stop middleware/api
  - cancel/stop button in intellij idea

- analyze docker files together!
  - middleware/api
  - frontend

Challenge Three – current status & next step



Challenge Three

- start minikube cluster
  - minikube config set memory 8192
  - minikube config set cpus 4
  - Minikube config set disk-size 10g
  - ~~minikube addons enable ingress~~
  - ~~minikube addons enable ingress-dns~~
  - minikube config set driver docker
  - minikube config view
  - minikube start

- good to know -> stop and reset
  - minikube stop
  - minikube delete
  - minikube config …
  - minikube start

Challenge Three

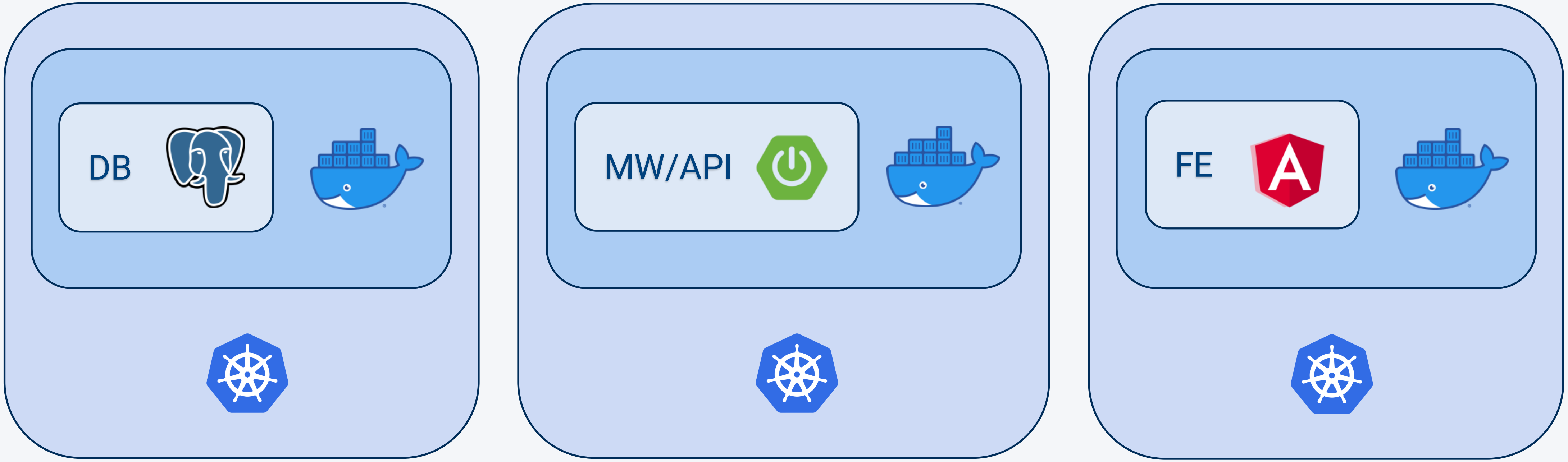
- tune middleware/api
  - new context-path and db-service environment variable
  - make sure docker image starts application with prod profile
  - **-> checkout branch feature/challenge-three**
- tune frontend
  - fix environments and nginx configuration
  - **-> checkout branch feature/challenge-three**
- tune kubernetes configuration files
  - wait what?! we will deal with them later...
  - **-> checkout branch feature/challenge-three**

Challenge Three

- build docker image and send it to minikube docker daemon (why?!)
    - open powershell and execute the following command precisely (!):
    - & minikube -p minikube docker-env --shell powershell | Invoke-Expression
    - test with: docker ps

- in booking-mw repo:
    - docker build . -t booking-mw
    - Test with: docker image list

Challenge Three – current status & next step



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Challenge Three

- deep dive together into kubernetes config files!

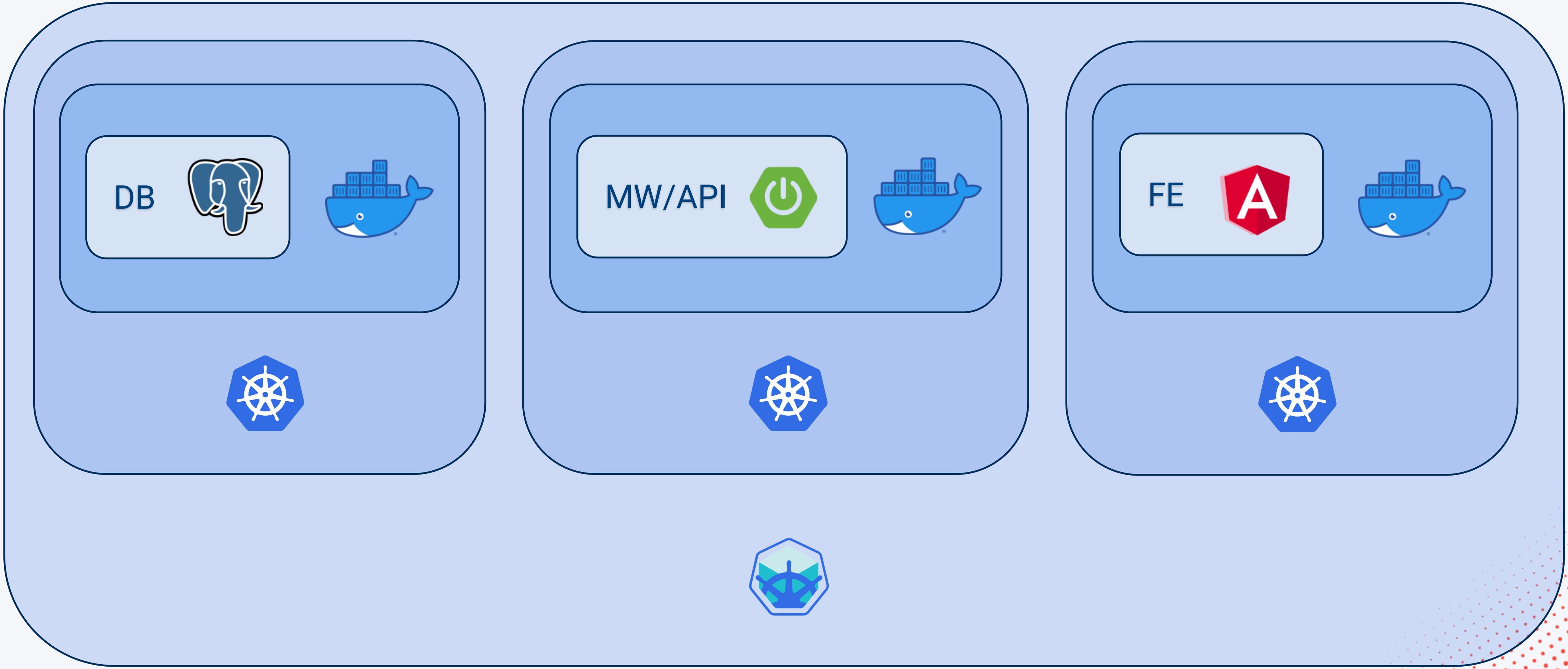
- kubectl get all
- cd booking-app/Kubernetes
- kubectl apply -f .\booking-storage.yml
- kubectl apply -f .\booking-database.yml
- kubectl apply -f .\booking-services.yml
- kubectl apply -f .\booking-workloads.yml
- kubectl get all
- kubectl describe node

Challenge Three

- access middleware in minikube cluster:
  - ~~minikube ip : <nodePort>~~
  - ~~minikube service booking-mw --url~~
  - kubectl port-forward service/booking-fe 8080:8080
  - the terminal must stay open!

  - add service url to booking-fe production environment. why?!

Challenge Three – current status & next step



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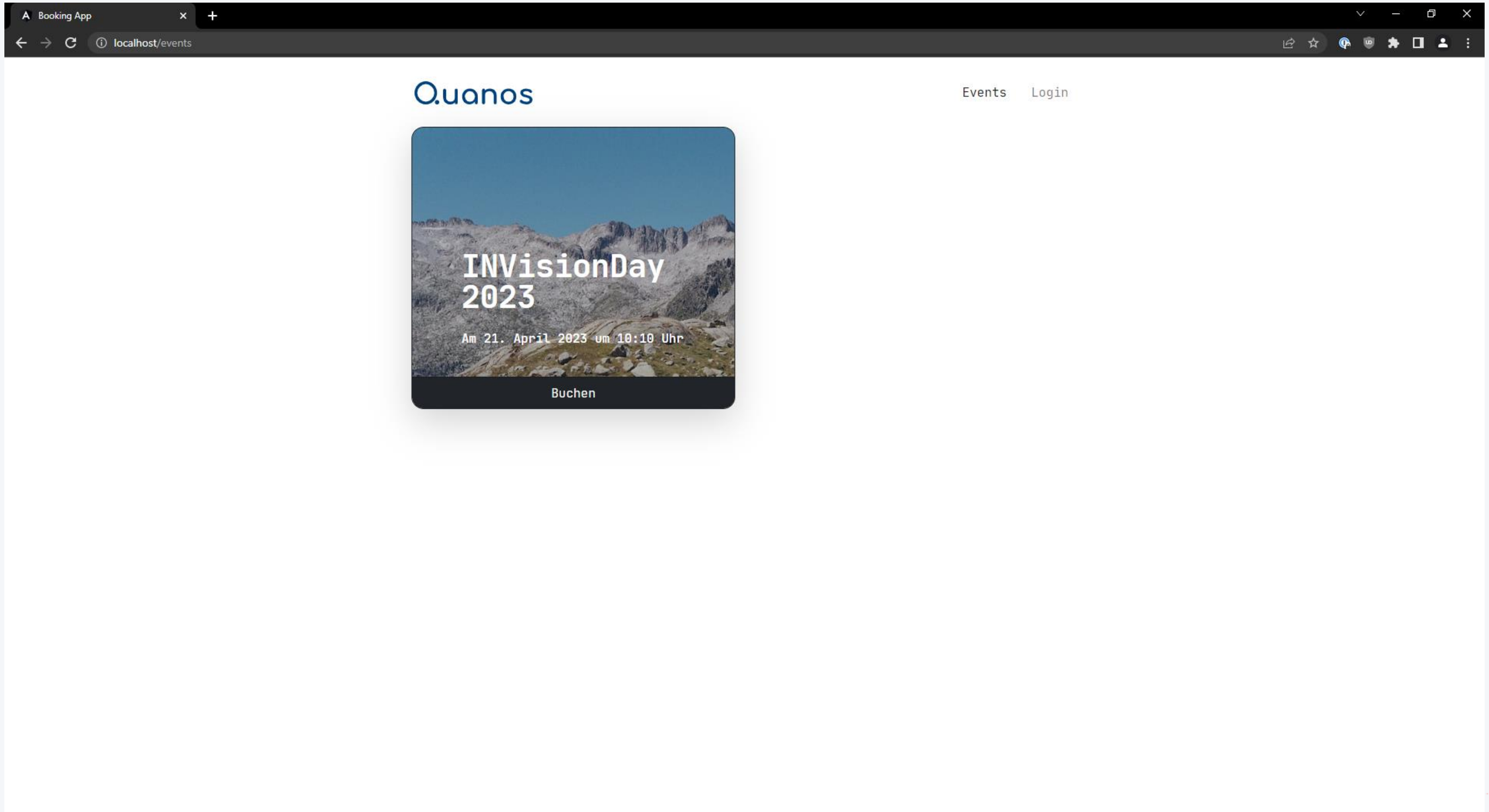
Challenge Three

- in booking-fe repo:
  - docker build . -t booking-fe
  - cave (!): is your docker-daemon connected to minikube?
- in booking-workloads.yml:
  - add booking-fe deployment
  - with containerPort 80
  - kubectl apply -f booking-workloads.yml
- in booking-services.yml:
  - add booking-fe service
  - with nodePort 30081
  - kubectl apply -f booking-services.yml
- access frontend in minikube cluster:
  - ~~minikube ip : <nodePort>~~
  - ~~minikube service booking-fe --url~~
  - kubectl port-forward service/booking-fe 80:80
- open url in browser
- -> checkout branch **feature/challenge-final-result** for solution

Challenge Three - Result

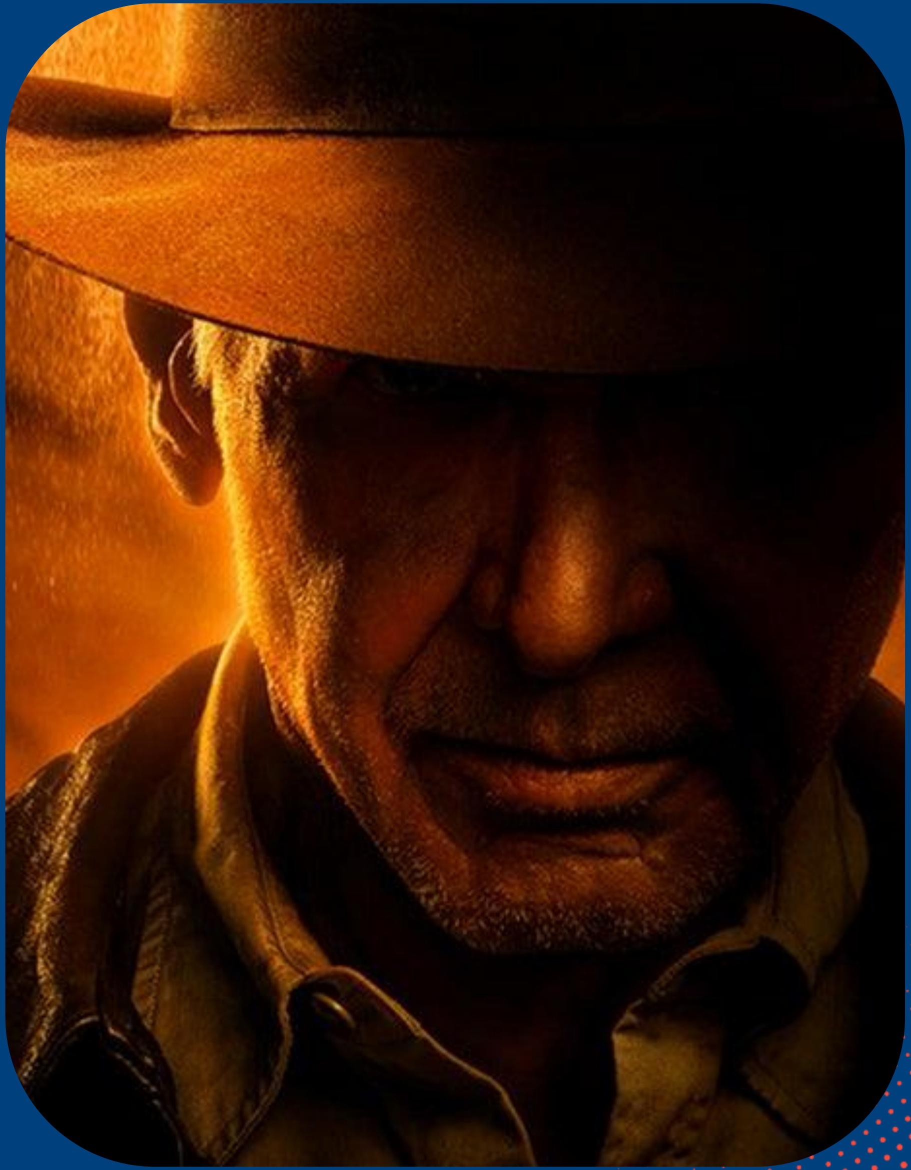


INVisionDay 2023

Am 21. April 2023 um 10:10 Uhr

Buchen

Wrap Up
and future prospects



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Wrap Up I

- technology is irrelevant - focus on the job and choose the best fitting tool to get the job done

„he chose ... poorly“

- architecture and patterns make you understand - try to see the big picture behind the technology chaos

„that's why they call it the jungle, sweetheart.”

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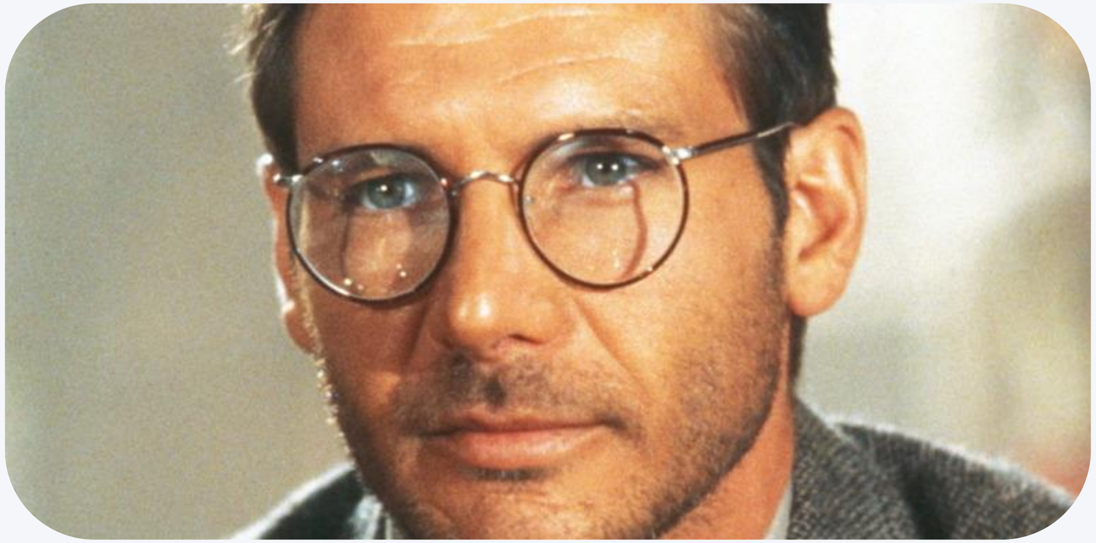
Wrap Up II

- don‘t let others choose your tech. they don‘t know your requirements. but add well tested and broadly used technologies to your solution to future-proof it.



„‘X’ never, ever marks the spot. “

- there is not just one simple solution. choose the one that fits you.

  do what you love –
  excellence comes with passion.

„fortune and glory, kid. fortune and glory.”

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Future prospects

- add new, cool – money generating – features
- add OAuth 2.0 security with keycloak (https://www.keycloak.org/)
- deploy on production kubernetes (aws, azure, hetzner, ...) ~~and integrate tls termination on ingress controller (ssl certificates -> https)~~
- add ingress controller with tls termination
- configure load-balancer and auto-scaling
- use ELK-stack (elastic search, logstash, kibana) to monitor your application

- enjoy and have fun extending the application ☺

Indiana Jones

“It's Not The Years, Honey, It's The Mileage.”

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