Kinga Gaździńska

No REST for the weary. Or is it? Welcome GraphQL

Software engineer at grupa pracuj

kinga.gazdzinska@pracuj.pl

https://www.linkedin.com/in/gazdzinskak/

https://github.com/gazdzinskak/GraphQL

Agenda

REST API & growing requirements

possible solutions in REST world

GraphQL introduction

ways to adapt GraphQL in existing software

What Shakespeare can teach us about APIs?

+

overall idea of GraphQL
scenarios where using GraphQL can help

+

overall idea of GraphQL
scenarios where using GraphQL can help

-

details and all features of GraphQL

Popularne w serwisie

Sprzedaż | Obsługa klienta | IT | Finanse / Ekonomia | Administracja biurowa

Produkcja | Pracownicy magazynu | Kierowcy | Mechanicy | Kasjerzy

Rekomendowane oferty

Znajdź pracę w...

Oferty dnia Superoferty

Zgłoś uwagę / opinię

Full Stack Developer

o firmie

2 lokalizacje ▲ ▼ 2018-08-23

Kraków, małopolskie

pokaż mapę

Białystok, podlaskie

Senior .NET Developer

powyżej 15 tys. zł brutto

Bielsko-Biała (okolice), Cieszyn (okolice), Ustroń, śląskie ▲ 2018-08-23

As our .NET Developer you goal will be to continuously develop and improve our mobile application written in Xamarin. You will be a part of a dynamic, dedicated and experienced team of mobile and .NET developers. ...

Job board

```
GET  /offers/

GET  /offers/search?jobTitle=.net

GET  /offers/{id}

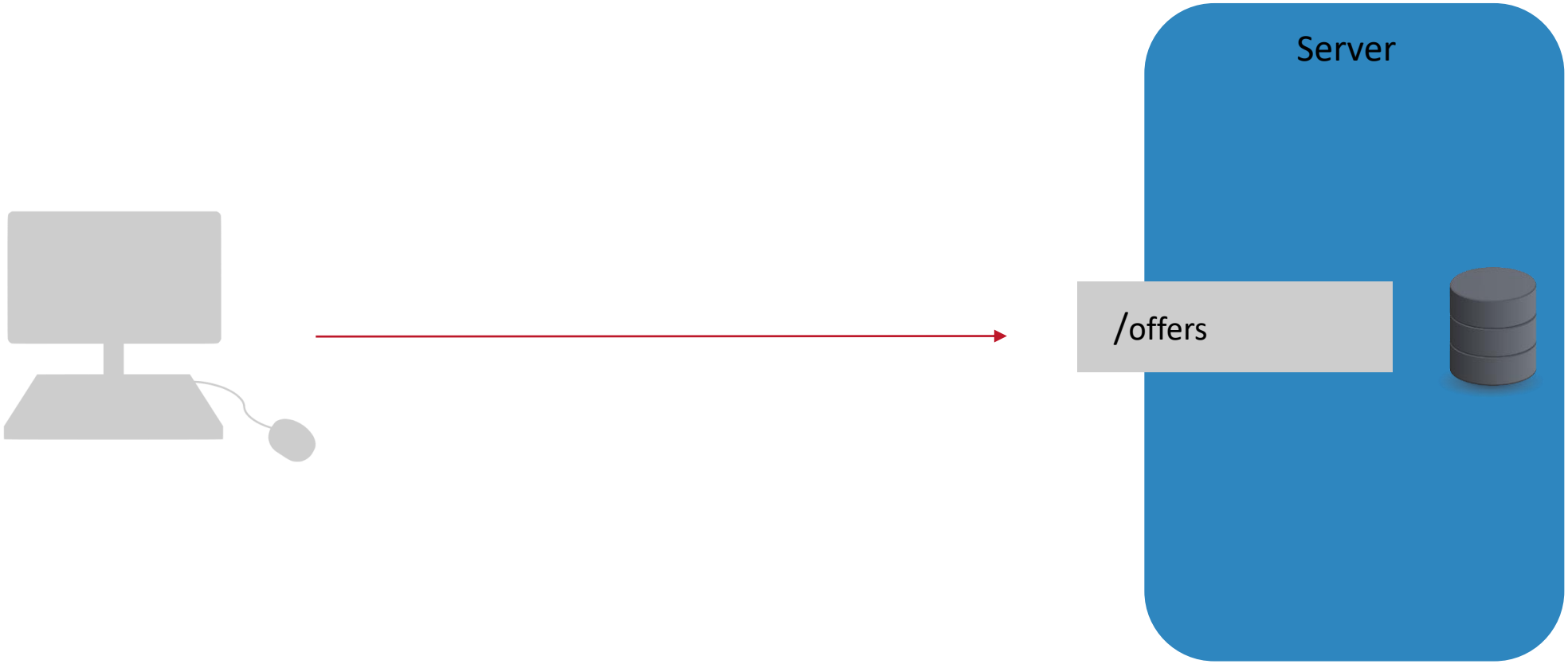
POST /offers/{id}/applications/{id}
```

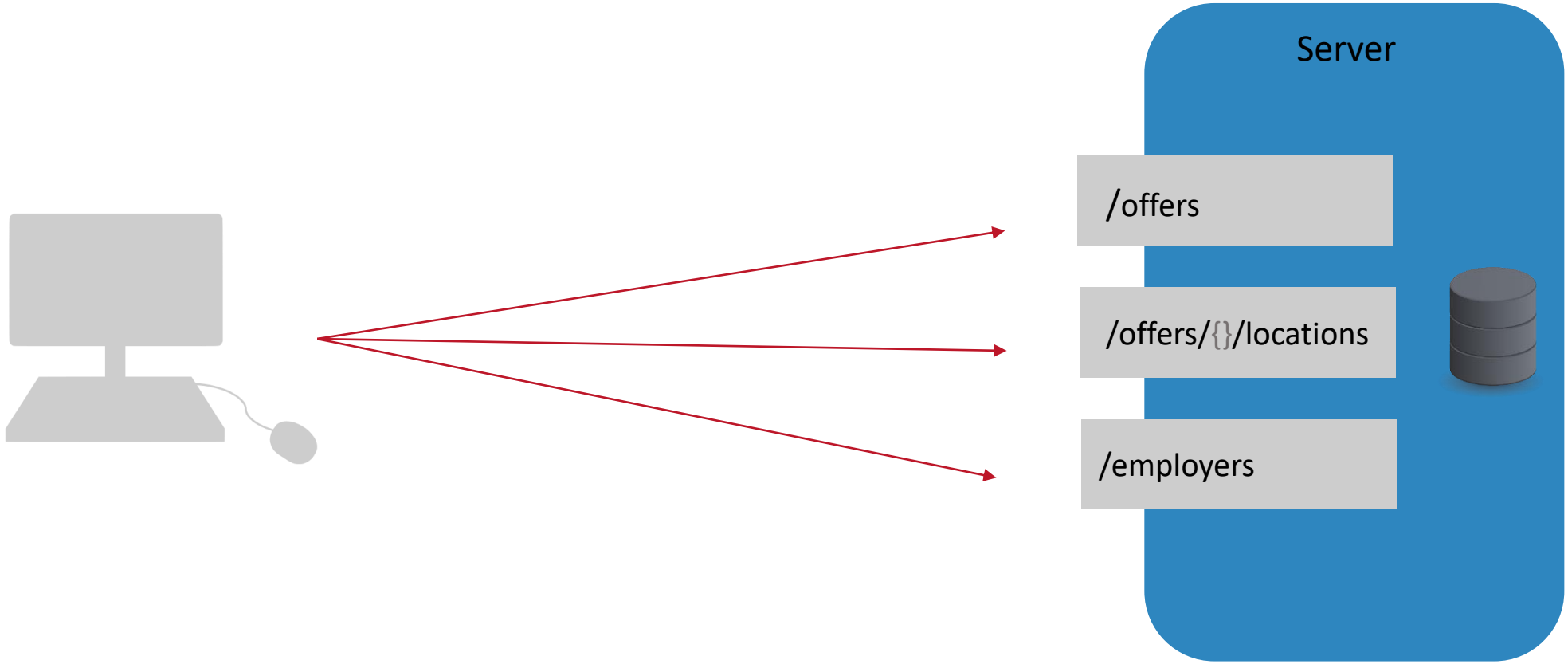
```
public class Offer
{
    public Guid OfferId { get; set; }
    public string JobTitle { get; set; }
    public GeoLocation Location { get; set; }
    public Employer Employer { get; set; }
    public DateTime ExpirationDateUtc { get; set; }
    public Salary Salary { get; set; }
}
```

```
GET /offers/44aa15544ba643d6a078f6151e93894e
```

GET /offers/*44aa15544ba643d6a078f6151e93894e*

```
{
  "offerId": "44aa1554-4ba6-43d6-a078-f6151e93894e",
  "jobTitle": "Frontend Developer",
  "location": {
    "cityName": "Cracov",
    "countryName": "Poland"
  },
  "employer": {
    "name": " Pretty Software Company",
    "address": {
      "cityName": "Warsaw",
      "countryName": "Poland"
    }
  },
  "expirationDateUtc": "2018-09-14T13:40:58.3467843Z",
  "salary": {
    "range": "10k -12k PLN"
  }
}
```


Server
/offers


Server
/offers
/offers/{}/locations
/employers

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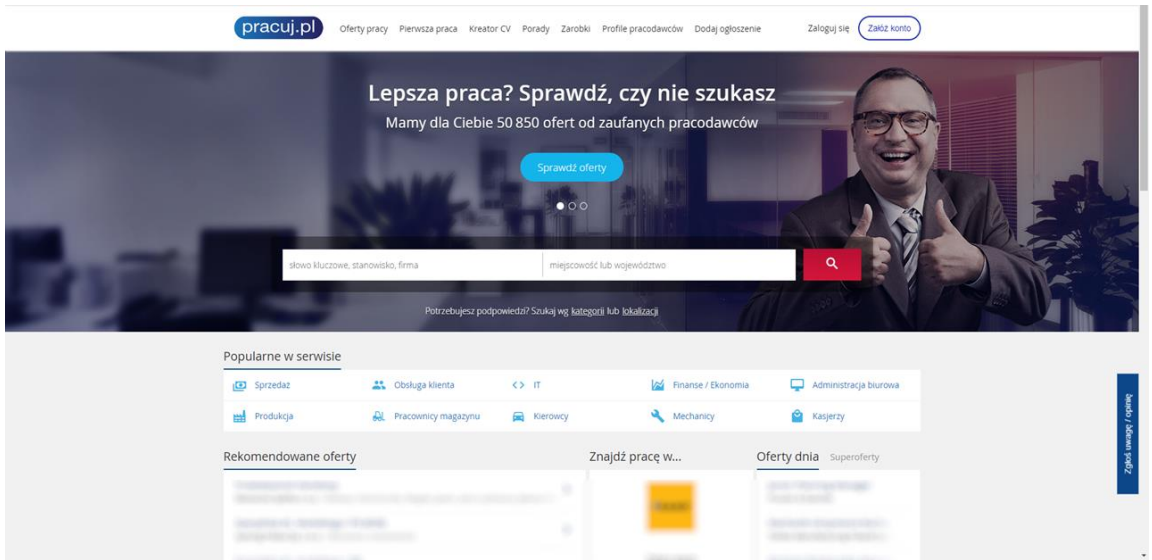
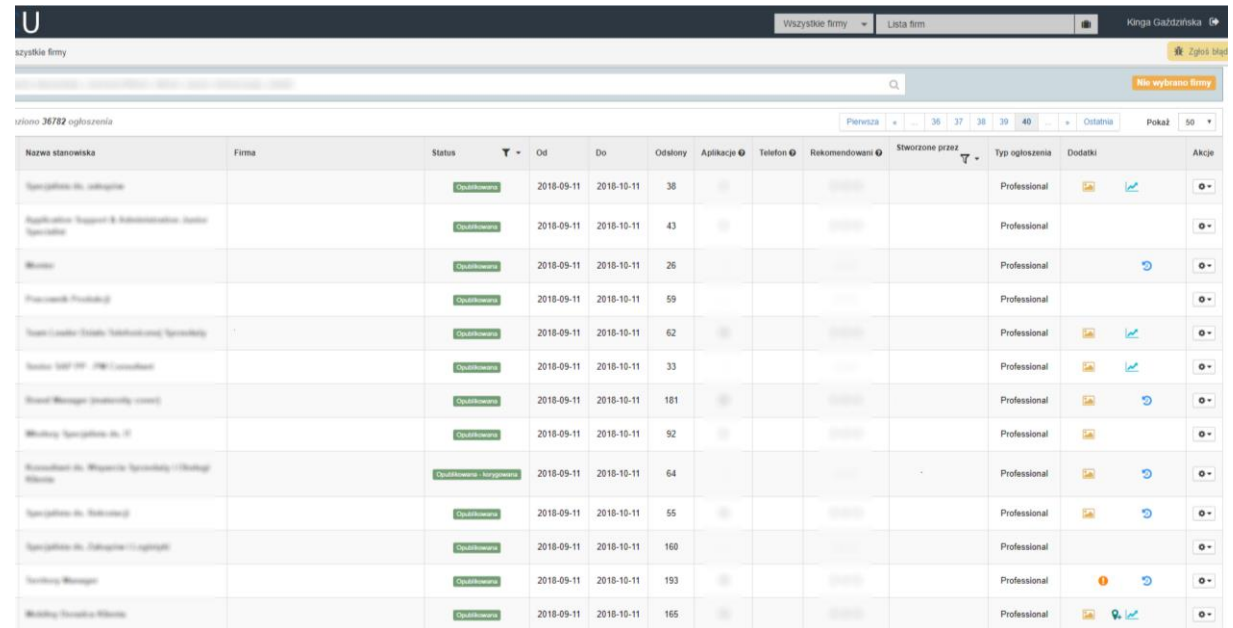

pracuj.pl
Oferty pracy
Pierwsza praca
Kreator CV
Porady
Zarobki
Profile pracodawców
Dodaj ogłoszenie
Zaloguj się
Załóż konto
Lepsza praca? Sprawdź, czy nie szukasz
Mamy dla Ciebie 50 850 ofert od zaufanych pracodawców
Sprawdź oferty
słowo kluczowe, stanowisko, firma
miejscowość lub województwo
Potrzebujesz podpowiedzi? Szukaj wg kategorii lub lokalizacji
Popularne w serwisie
Sprzedaż
Obsługa klienta
IT
Finanse / Ekonomia
Administracja biurowa
Produkcja
Pracownicy magazynu
Kierowcy
Mechanicy
Kasjerzy
Rekomendowane oferty
Znajdź pracę w...
Oferty dnia
Superoferty


Wszystkie firmy
Lista firm
Kinga Gaździńska
Nie wybrano firmy
Nazwa stanowiska
Firma
Status
Od
Do
Odsłony
Aplikacje
Telefon
Rekomendowani
Stworzone przez
Typ ogłoszenia
Dodatki
Akcje
Professional

Back office

lp.	Nazwa stanowiska	Firma	Status	Od - Do	Odsł.	Aplikacje	Tel.	Rek.	Stworzone przez	Typ ogłoszenia	Dodatki	Akcje
1.	[redacted]	[redacted]	Archiwalna	2017-03-28 2017-03-28	2	2		- / - / -	Kinga Gaździńska	Basic		
2.	[redacted]	[redacted]	Archiwalna	2017-01-26 2017-01-26	1	-		- / - / -	Kinga Gaździńska	Basic		
3.	[redacted]	[redacted]	Archiwalna	2016-05-19 2016-05-19	2	-		- / - / -	Kinga Gaździńska	Basic		

Back office

GET /offers/
GET /offers/search?

```
public class Offer
{
    public Guid OfferId { get; set; }
    public string JobTitle { get; set; }
    public GeoLocation Location { get; set; }
    public Employer Employer { get; set; }
    public DateTime ExpirationDateUtc { get; set; }
    public Salary Salary { get; set; }
}
```

Back office

GET /offers/
GET /offers/search?

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    public GeoLocation Location { get; set; }
    public Employer Employer { get; set; }
    public DateTime CreationDateUtc { get; set; }
    public DateTime ExpirationDateUtc { get; set; }
    public Salary Salary { get; set; }
    public int ApplicationsNumber { get; set; }
}
```

Back office

GET /offers/
GET /offers/search?

```
public class Offer
{
    public Guid OfferId { get; set; }
    public string JobTitle { get; set; }
    public GeoLocation Location { get; set; }
    public Employer Employer { get; set; }
    public DateTime CreationDateUtc { get; set; }
    public DateTime ExpirationDateUtc { get; set; }
    public Salary Salary { get; set; }
    public int ApplicationsNumber { get; set; }
}
```

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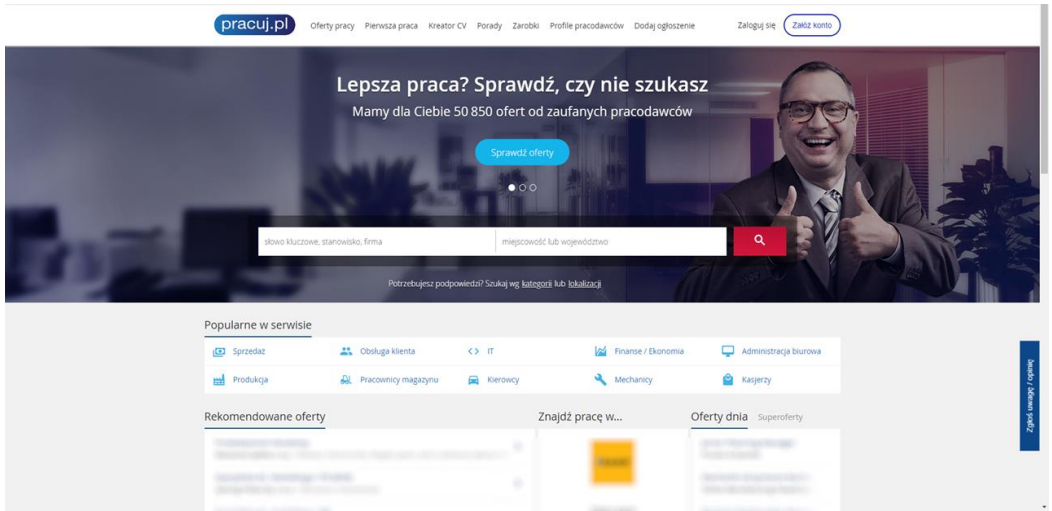
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Pierwsza praca
Kreator CV
Porady
Zarobki
Profile pracodawców
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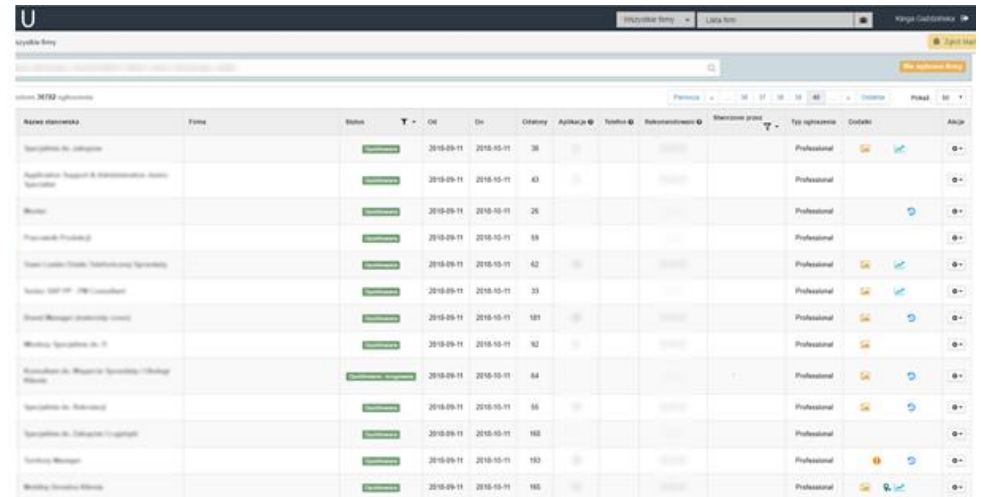
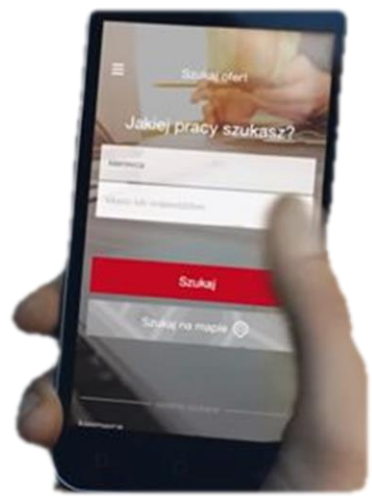
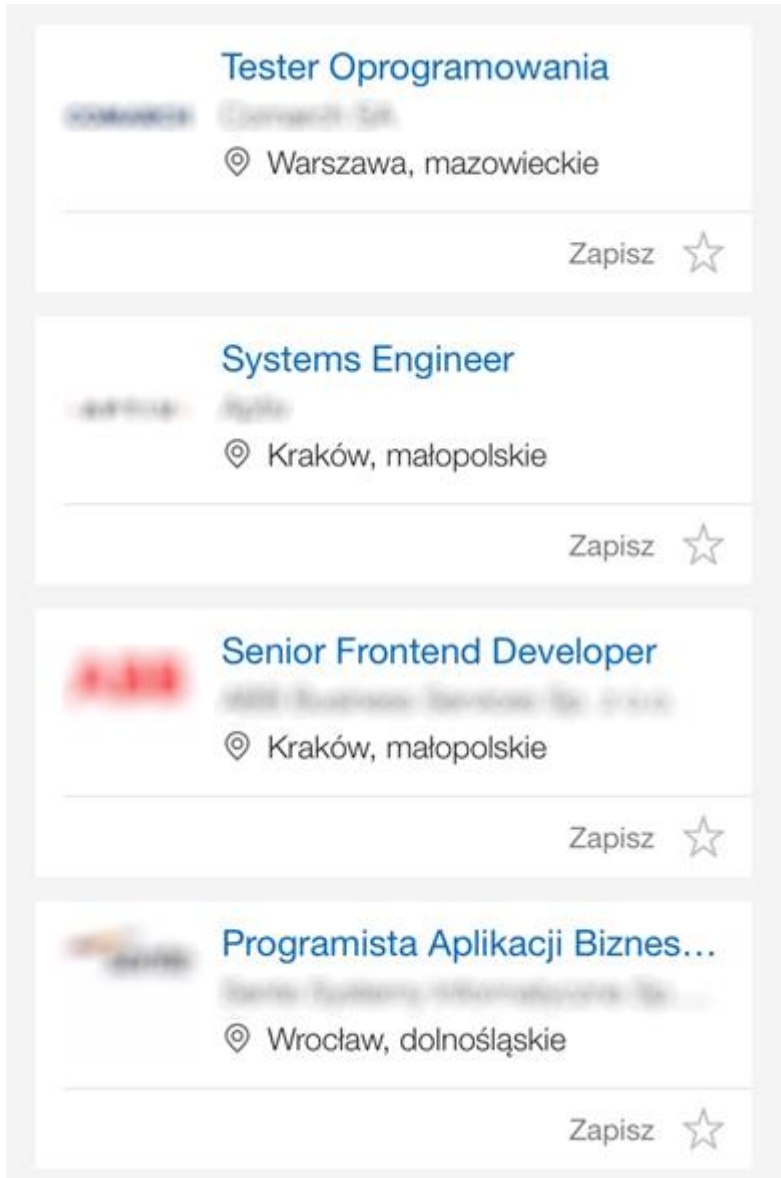



Jakiej pracy szukasz?
Szukaj
Szukaj na mapie


Tester Oprogramowania
Warszawa, mazowieckie
Zapisz
Systems Engineer
Kraków, małopolskie
Zapisz
Senior Frontend Developer
Kraków, małopolskie
Zapisz
Programista Aplikacji Biznes...
Wrocław, dolnośląskie
Zapisz

Mobile App

GET /offers/
GET /offers/search?

```
public class Offer
{
    public Guid OfferId { get; set; }
    public string JobTitle { get; set; }
    public GeoLocation Location { get; set; }
    public Employer Employer { get; set; }
    public DateTime ExpirationDateUtc { get; set; }
    public Salary Salary { get; set; }
}
```

Mobile App

GET /offers/
GET /offers/search?

```
public class Offer
{
    public Guid OfferId { get; set; }
    public string JobTitle { get; set; }
    public GeoLocation Location { get; set; }
    public Employer Employer { get; set; }
    public DateTime ExpirationDateUtc { get; set; }
    public Salary Salary { get; set; }
}
```

Mobile App

GET /offers/
GET /offers/search?

```
public class Offer
{
    public Guid OfferId { get; set; }
    public string JobTitle { get; set; }
    public GeoLocation Location { get; set; }
    public Employer Employer { get; set; } → public string EmployerName { get; set; }
    public DateTime ExpirationDateUtc { get; set; }
    public Salary Salary { get; set; }
}
```

Requirements

different set of information for each UI

no excessive data transfer usage

new features provided easily and quickly

change in one UI shouldn’t force change in another one

#1 One suit-them-all endpoint?

-

excessive data transfer usage
too much information revealed
entanglement between clients
no fast changes

+

one place to change and maintain

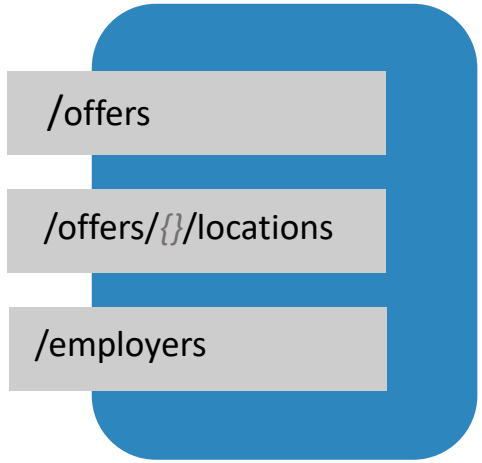
#2 Separate endpoints

-

too much information revealed
excessive data usage
many calls to build a model

+

more elasticity in designing UI
clean API



#3 Backends for frontends

-

messy API
maintenance problems
many places to change
UI driven backends

+

tailored data model
client oriented
control over what client gets

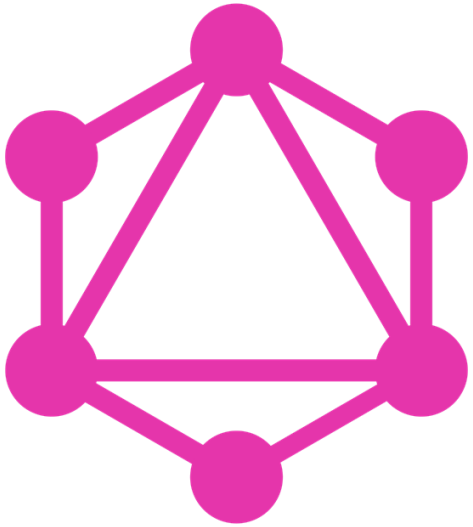
1806 km
KUTAISI
GEORGIA
8900 km
DAEGU
KOREA
1921 km
GYUMRI
ARMENIA
7800 km
LUOYANG
CHINA
403 km
КОШИЦЕ
СЛОВАКИЯ
1096 км
БЪРНО
ЧЕХИЯ
ПОЗНАН
ПОЛША
САНКТ-ПЕТЕРБУРГ
РУСИЯ
2435 КМ
324 км
E
N
W

https://www.flickr.com/
https://commons.wikimedia.org

GraphQL

query language specification for an API

created by FB in 2012, announced 2015



implemented in a variety of programming languages

not tied to any specific DB technology

there may be no DB at all!

Hello offer

```
{
    offer(id: "44aa1554-4ba6-43d6-a078-f6151e93894e") {
        jobTitle
        expirationDateUtc
    }
}
```

Hello offer

```
{
    offer(id: "44aa1554-4ba6-43d6-a078-f6151e93894e") {
        jobTitle
        expirationDateUtc
    }
}
```

```
{
    "data": {
        "offer": {
                "jobTitle": "Frontend Developer",
                "expirationDateUtc": "2018-09-14"
        }
    }
}
```

```
{
  "errors": [
    {
      "message": "GraphQL.ExecutionError: Syntax Error GraphQL (5:1) Unexpected }
        [...] ---> GraphQLParser.Exceptions.GraphQLSyntaxErrorException: [...]",
      "extensions": {
        "code": "SYNTAX_ERROR"
      }
    }
  ]
}
```

POST /graphql

```
{
  "query": "{\n offer(id:\"44aa1554-4ba6-43d6-a078-f6151e93894e
       \") {\n jobTitle\n expirationDateUtc\n}\n}\n",
  "variables": null,
  "operationName": null
}
```

API’s capabilities definition

what kinds of operations are available?

defined resources?

structure of resources?

relationships between objects?

API’s capabilities definition

what kinds of operations are available?

defined resources?

structure of resources?

relationships between objects?

schema!

```
offer(id: "44aa1554-4ba6-43d6-a078-f6151e93894e") {
  jobTitle
  employer {
    name
  }
}
```

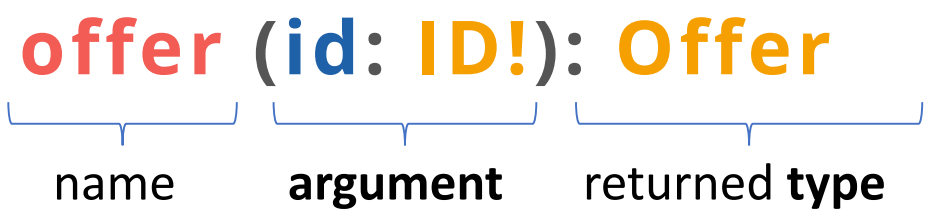
```
query MobileView {
  offer(id: "44aa1554-4ba6-43d6-a078-f6151e93894e") {
    jobTitle
    employer {
      name
    }
  }
}
```

```
query MobileView {
  offer(id: "44aa1554-4ba6-43d6-a078-f6151e93894e") {
    jobTitle
    employer {
      name
    }
  }
}
```

operation name

```
query MobileView {
  offer(id: "44aa1554-4ba6-43d6-a078-f6151e93894e") {
    jobTitle
    employer {
      name
    }
  }
}
```

```
query MobileView {
  offer(id: "44aa1554-4ba6-43d6-a078-f6151e93894e") {
    jobTitle
    employer {
      name
    }
  }
}
```


offer (id: ID!): Offer
name
argument
returned type

```
offer (id: ID!): Offer
```

name **argument** returned **type**

```
offers: [Offer]
```

name returned **type**

offer(id: ID!): Offer

```
type Offer {
  "applicationsNumber": "Int",
  "creationDateUtc": "Date!",
  "employer": "EmployerType",
  "expirationDateUtc": "Date!",
  "jobTitle": "String!",
  "location": "GeoLocationType",
  "offerId": "ID",
  "salary": "SalaryType"
}
```

```
offer(id: ID!): Offer
```

```
query MobileView {
  offer(id: "44aa1554-4ba6-43d6-a078-f6151e93894e") {
    jobTitle
    employer {
      name
    }
  }
}
```

```
type Offer {
  "applicationsNumber": "Int",
  "creationDateUtc": "Date!",
  "employer": "EmployerType",
  "expirationDateUtc": "Date!",
  "jobTitle": "String!",
  "location": "GeoLocationType",
  "offerId": "ID",
  "salary": "SalaryType"
}
```

```
type EmployerType {
  address: GeoLocationType
  name: String!
}
```

offer(id: ID!): Offer

```
query MobileView {
  offer(id: "44aa1554-4ba6-43d6-a078-f6151e93894e") {
    jobTitle
    employer {
      name
    }
  }
}
```

argument

```
type Offer {
  "applicationsNumber": "Int",
  "creationDateUtc": "Date!",
  "employer": "EmployerType",
  "expirationDateUtc": "Date!",
  "jobTitle": "String!",
  "location": "GeoLocationType",
  "offerId": "ID",
  "salary": "SalaryType"
}

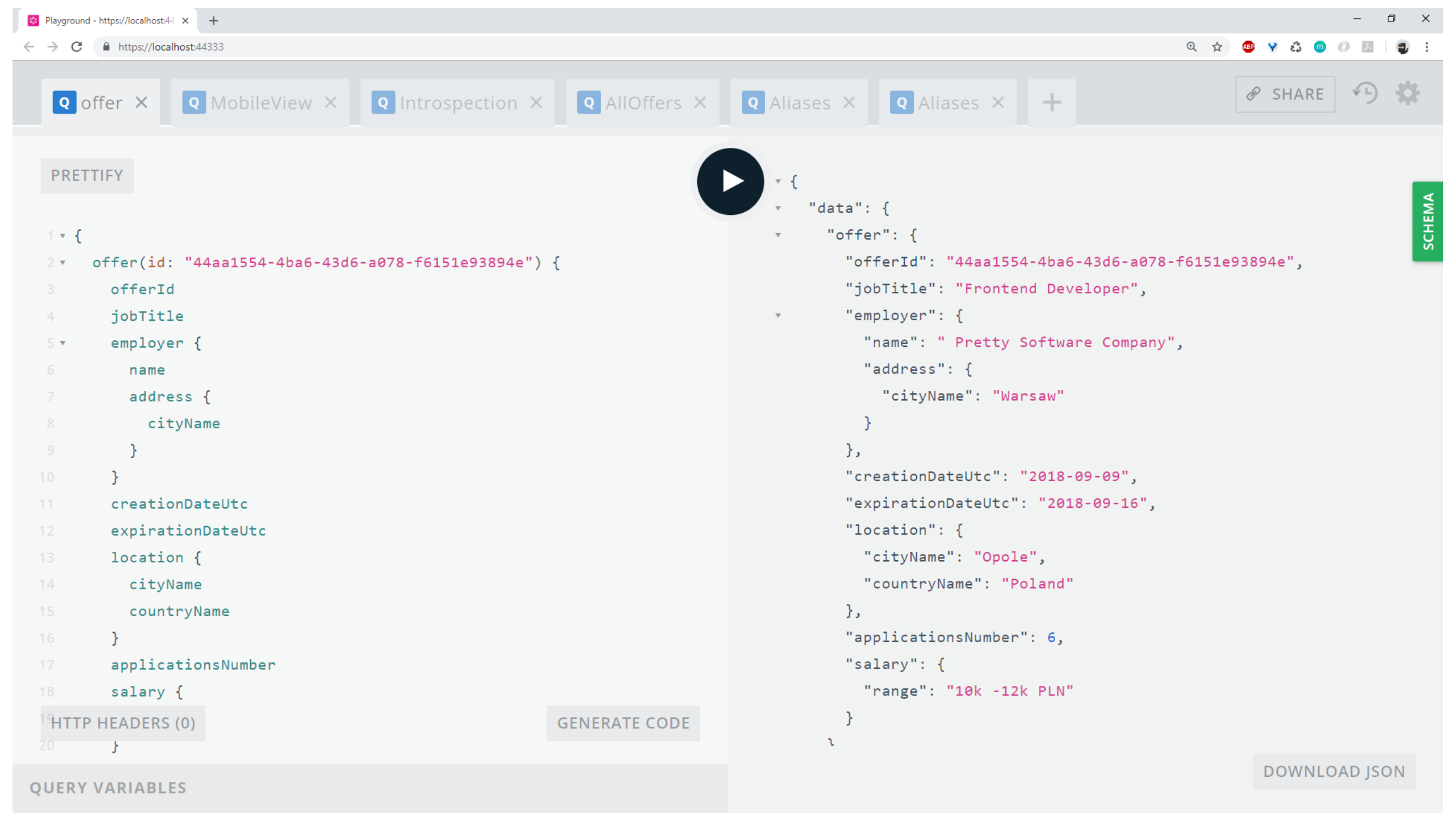
type EmployerType {
  address: GeoLocationType
  name: String!
}
```

offer(id: ID!): Offer

```
query MobileView {
  offer(id: "44aa1554-4ba6-43d6-a078-f6151e93894e") {
    jobTitle
    employer {
      name
    }
  }
}
```

```
type Offer {
  "applicationsNumber": "Int",
  "creationDateUtc": "Date!",
  "employer": "EmployerType",
  "expirationDateUtc": "Date!",
  "jobTitle": "String!",
  "location": "GeoLocationType",
  "offerId": "ID",
  "salary": "SalaryType"
}
```

```
type EmployerType {
  address: GeoLocationType
  name: String!
}
```


Playground - https://localhost:44
https://localhost:44333
offer
MobileView
Introspection
AllOffers
Aliases
Aliases
SHARE
PRETTIFY
{
offer(id: "44aa1554-4ba6-43d6-a078-f6151e93894e") {
offerId
jobTitle
employer {
name
address {
cityName
}
}
creationDateUtc
expirationDateUtc
location {
cityName
countryName
}
applicationsNumber
salary {
}
HTTP HEADERS (0)
GENERATE CODE
QUERY VARIABLES
{
"data": {
"offer": {
"offerId": "44aa1554-4ba6-43d6-a078-f6151e93894e",
"jobTitle": "Frontend Developer",
"employer": {
"name": " Pretty Software Company",
"address": {
"cityName": "Warsaw"
}
},
"creationDateUtc": "2018-09-09",
"expirationDateUtc": "2018-09-16",
"location": {
"cityName": "Opole",
"countryName": "Poland"
},
"applicationsNumber": 6,
"salary": {
"range": "10k -12k PLN"
}
DOWNLOAD JSON
SCHEMA

GraphQL Server

https://graphql-dotnet.github.io/

```
dotnet add package GraphQL --version 2.0.0
```

or

```
dotnet new --install "Boxed.Templates::*"
dotnet new graphql
```

```
public MainSchema(QueryObject query, IDependencyResolver resolver)
             : base(resolver)
{
    Query = resolver.Resolve<QueryObject>();
}
```

```
public QueryObject(IOfferRepository offerRepository)
{
    this.Name = "Query";
    this.Description = "The query type, represents all of the entry points
        into our object graph.";

    this.FieldAsync<OfferType>(
        name: "offer",
        description: "Get an offer by it's unique identifier.",
        arguments: new QueryArguments(
            new QueryArgument<NonNullGraphType<IdGraphType>>()
            {
                Name = "id",
                Description = "The unique identifier of the offer.",
            }),
        resolve: context => GetOffer(offerRepository,
                                context.GetArgument("id", Guid.Empty),
                                context.CancellationToken));
}
```

```
public QueryObject(IOfferRepository offerRepository)
{
    this.Name = "Query";
    this.Description = "The query type, represents all of the entry points
        into our object graph.";

    this.FieldAsync<OfferType>(
        name: "offer",
        description: "Get an offer by it's unique identifier.",
        arguments: new QueryArguments(
            new QueryArgument<NonNullGraphType<IdGraphType>>()
            {
                Name = "id",
                Description = "The unique identifier of the offer.",
            }),
        resolve: context => GetOffer(offerRepository,
                                     context.GetArgument("id", Guid.Empty),
                                     context.CancellationToken));
}
```

```
public class OfferType : ObjectGraphType<Offer>
    {
        public OfferType()
        {
                Field(x => x.OfferId, type: typeof(IdGraphType));
                Field(x => x.JobTitle).Description("Job title");
                Field(x => x.ExpirationDateUtc);
        }
    }
```

```
public class OfferType : ObjectGraphType<Offer>
    {
        public OfferType()
        {
                Field(x => x.OfferId, type: typeof(IdGraphType));
                Field(x => x.JobTitle).Description("Job title");
                Field(x => x.ExpirationDateUtc);
                Field(x => x.CreationDateUtc)
                        .AuthorizeWith(AuthorizationPolicyName.Admin);
                Field(x => x.ApplicationsNumber, nullable: true);
        }
    }
```

```
public class OfferType : ObjectGraphType<Offer>
    {
        public OfferType()
        {
                Field(x => x.OfferId, type: typeof(IdGraphType));
                Field(x => x.JobTitle).Description("Job title");
                Field(x => x.ExpirationDateUtc);
                Field(x => x.CreationDateUtc)
                        .AuthorizeWith(AuthorizationPolicyName.Admin);
                Field(x => x.ApplicationsNumber, nullable: true);
                Field<EmployerType>("employer");
                Field<GeoLocationType>("location");
                Field<SalaryType>("salary");
        }
    }
```

Other types of operation

mutation

subscription

```
schema {
   query: Query
   mutation: Mutation
   subscription: Subscription
}
```

When to use GraphQL?

readonly data

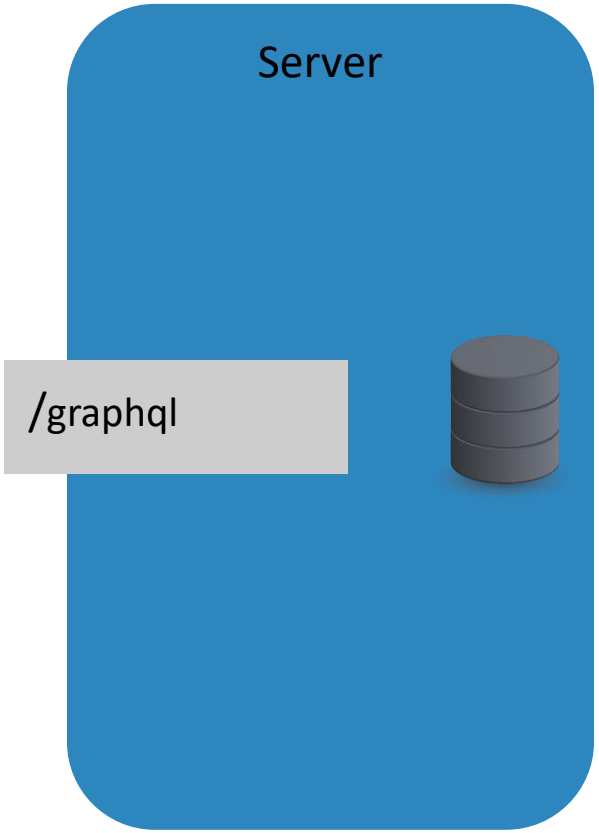
many UIs, single API

frontend not driven by backend

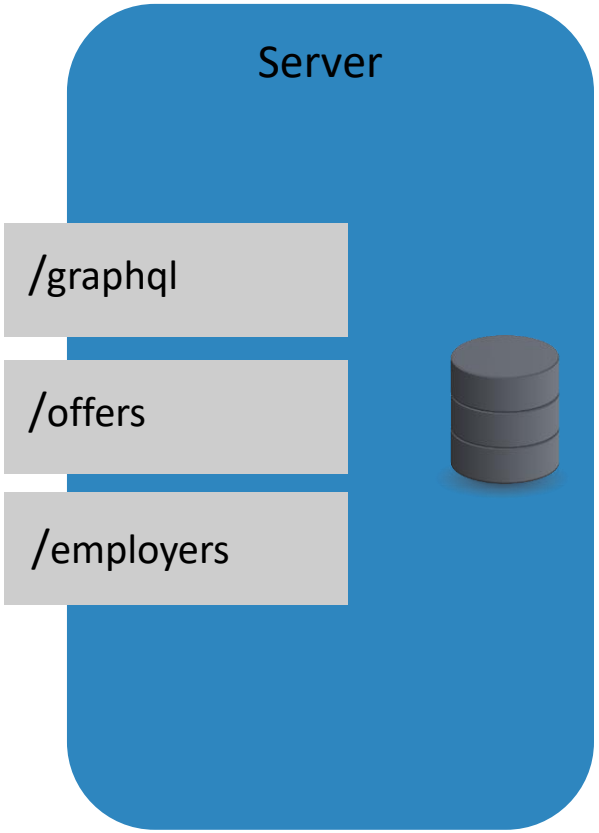
not knowing clients' exact needs – (e.g. public APIs)

frequent UI changes (agile environment)

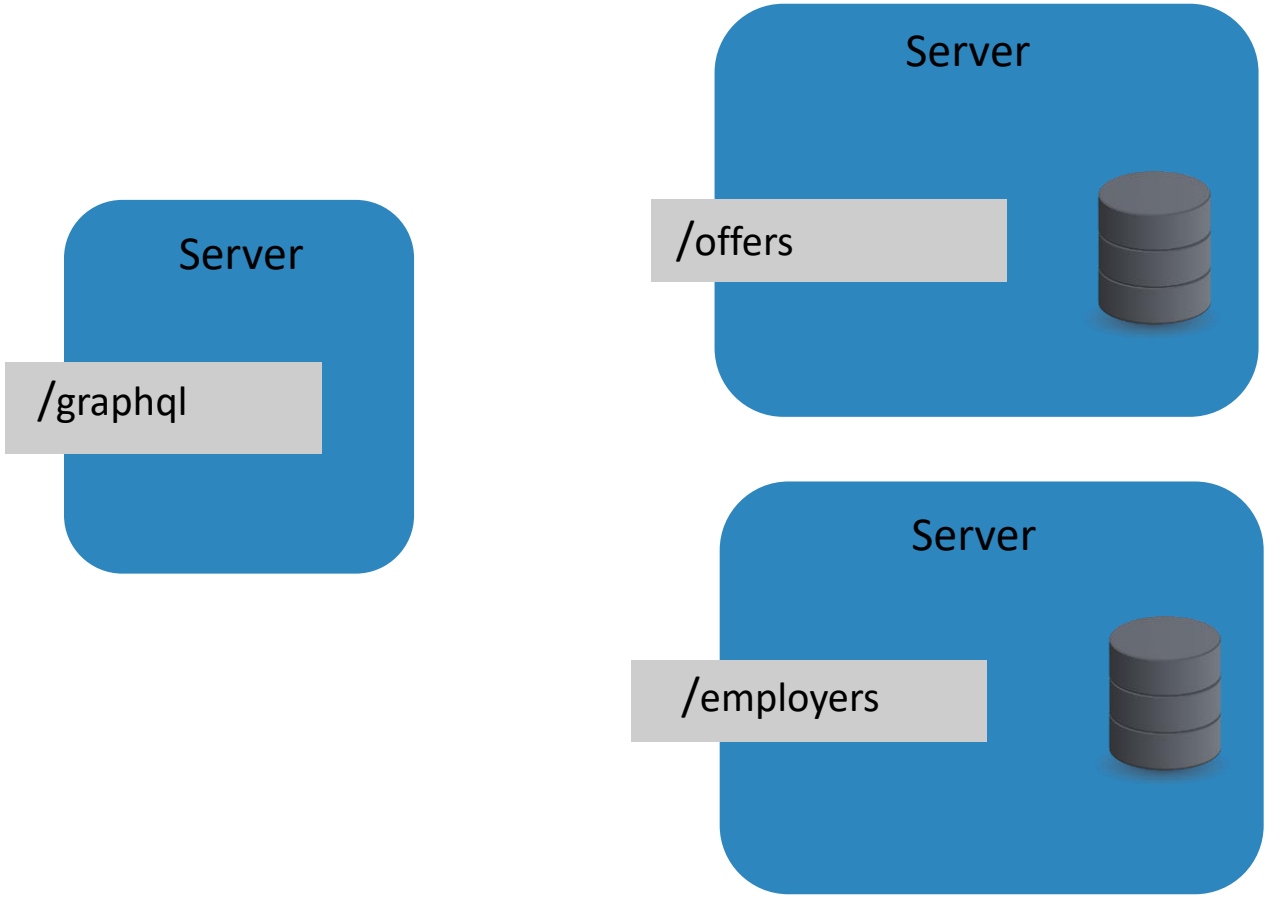
Architecture possibilities #1

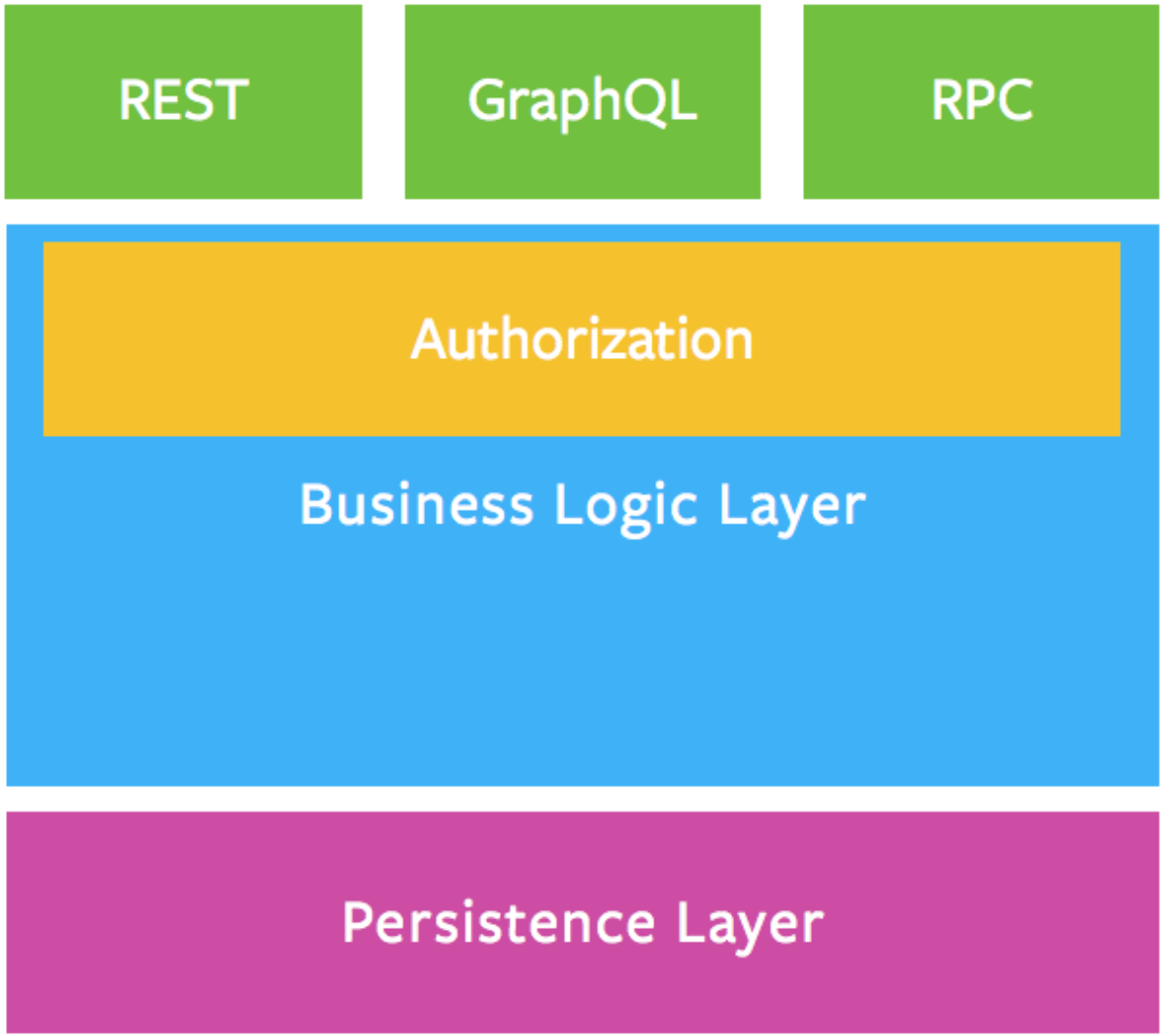


Architecture possibilities #2



Architecture possibilities #3





http://graphql.github.io/learn/thinking-in-graphs/#business-logic-layer

Who's using GraphQL?

Facebook's mobile apps have been powered by GraphQL since 2012.
A GraphQL spec was open sourced in 2015 and is now available in
many environments and used by teams of all sizes.

https://graphql.org/

Before rewriting every API to GraphQL…

understand the tradeoffs

What about REST?

service to service communication

operations modifying resources

validation of provided data

optimization around resources not clients

caching

monitoring

constraints on client’s behaviour

Conclusion

presented with legitimate proof based on
mathematics,
literature
and common sense

If...

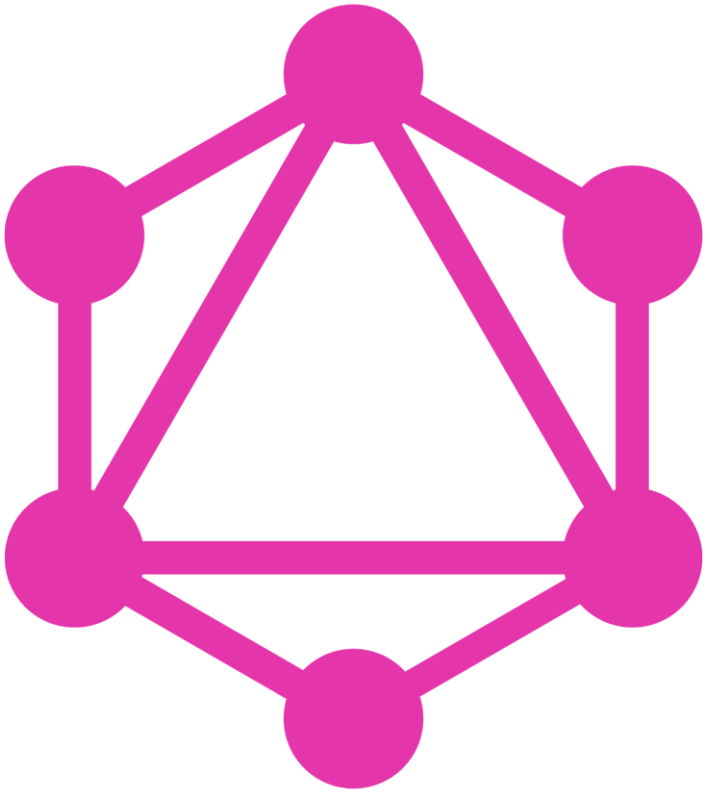
Speech is silver and silence is golden

- proverb

Where

Speech is silver and **silence** is golden

The **speech** was about GraphQL



And

Speech is silver and **silence** is golden

speech = GraphQL

The rest is **silence**

– *W. Shakespeare*

Then

Speech is silver and **silence** is golden

speech = GraphQL

silence = rest

GraphQL is silver and **REST** is golden.

GraphQL, REST, gRPC, carrier pigeons…

Use whatever suits your needs!

More resources...

https://graphql.org/

https://graphql-dotnet.github.io/

https://www.prisma.io/blog/introducing-graphql-playground-f1e0a018f05d/

https://developer.github.com/v4/

https://hackernoon.com/graphql-tips-after-a-year-in-production-419341db52e3/

https://no-kill-switch.ghost.io/graphql-is-awesome-you-should-probably-not-use-it/

kinga.gazdzinska@pracuj.pl

https://www.linkedin.com/in/gazdzinskak/

https://github.com/gazdzinskak/GraphQL

Ask The Experts Zone

Meet me at the ATE zone:

- Wednesday at 17:15

Please rate this session using

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at the booth in the Exhibition Hall