

Your Link to REST

Wie WebAPIs durch **Hypermedia** lange haltbar bleiben.

Probleme von WebAPIs

- bei Änderungen an WebAPIs müssen gleichzeitig alle Clients angepasst werden
- fehlende Wiederverwendung auch bei nur geringen Unterschieden des Einsatzzwecks (z.B. sind Facebook- und Twitter-API zu unterschiedlich)
- Grund: zu starke Kopplung zwischen Server und Client

Beispiel-Changelog:

- Änderung der Base-URL von *api.twitter.com/v5* zu *api.twitter.com/v6*
- Endpoint *statuses/update_with_media* veraltet; stattdessen *statuses/update* verwenden!
- Nutzer müssen jetzt Stimmung (Parameter *mood*) beim Senden eines Tweets angeben

Änderungen müssen
per Hand
implementiert
werden

Änderungen an WebAPIs sind problematisch, sobald Clients außerhalb des eigenen Einflussbereichs liegen.

API Reference contents ^

POST statuses/update

POST statuses/destroy/:id

GET statuses/show/:id

GET statuses/oembed

GET statuses/lookup

POST statuses/retweet/:id

POST statuses/unretweet/:id

GET statuses/retweets/:id

GET statuses/retweets_of_me

GET statuses/retweeters/ids

POST favorites/create

POST favorites/destroy

GET favorites/list

POST statuses/update_with_media (deprecated)

URLs werden
hardgecodet

POST statuses/update

Updates the authenticating user's current status, also known as Tweeting.

For each update attempt, the update text is compared with the authenticating user's recent Tweets. Any attempt that would result in a duplicate Tweet will be blocked, resulting in a 403 error. A user cannot submit the same status twice in a row.

While not rate limited by the API, a user is limited in the number of Tweets they can create at a time. If the number of updates posted by the user reaches the current allowed limit this method will return an HTTP 403 error.

viel Fließtext

Ein Client sollte möglichst viele Informationen von Server bekommen.

Wie? Mit **Hypermedia** (wie Websites).

Representational State Transfer

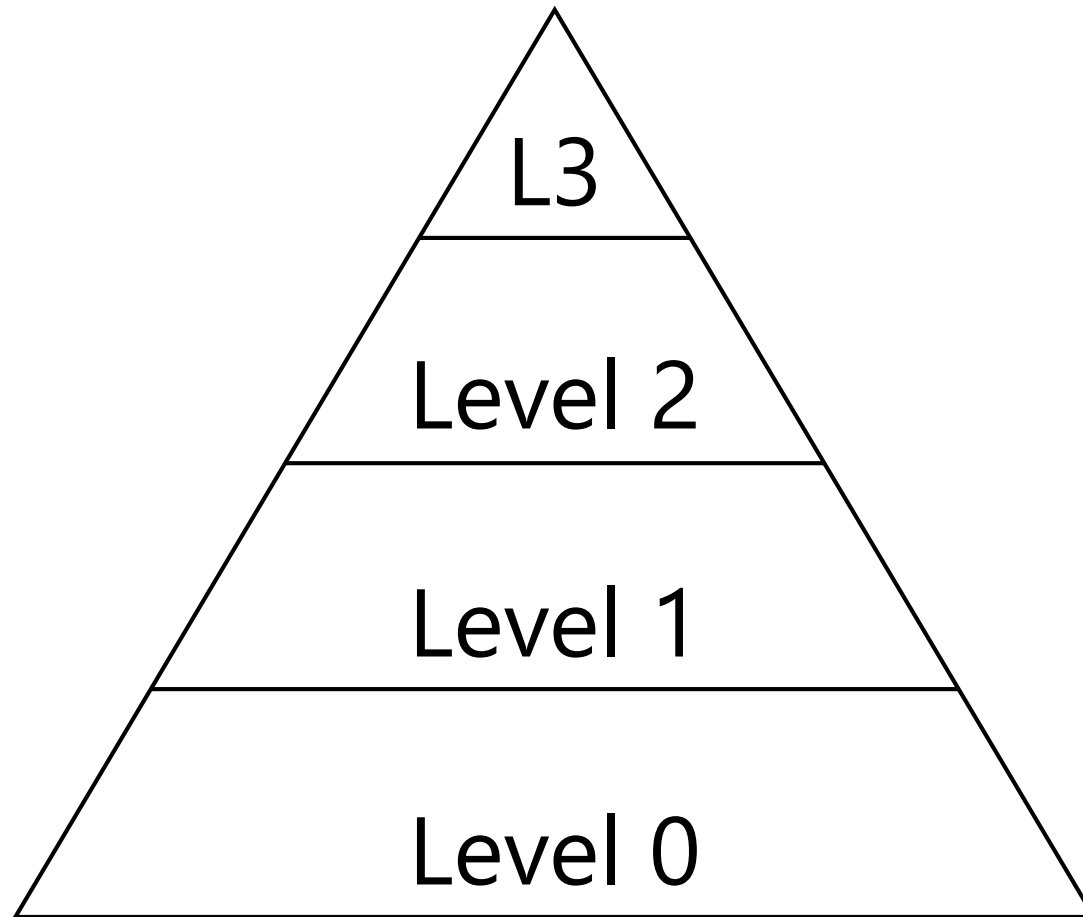
= Architekturstil mit sechs Constraints

- Client-Server
- Stateless
- Cachable
- Layered System
- Code on Demand
- Uniform Interface

Uniform-Interface-Constraint

- Resource Identification
- Hypermedia as the Engine of Application State (HATEOAS)

Richardson-Maturity-Model



mehrere URLs, mehrere HTTP-Methode, Hypermedia

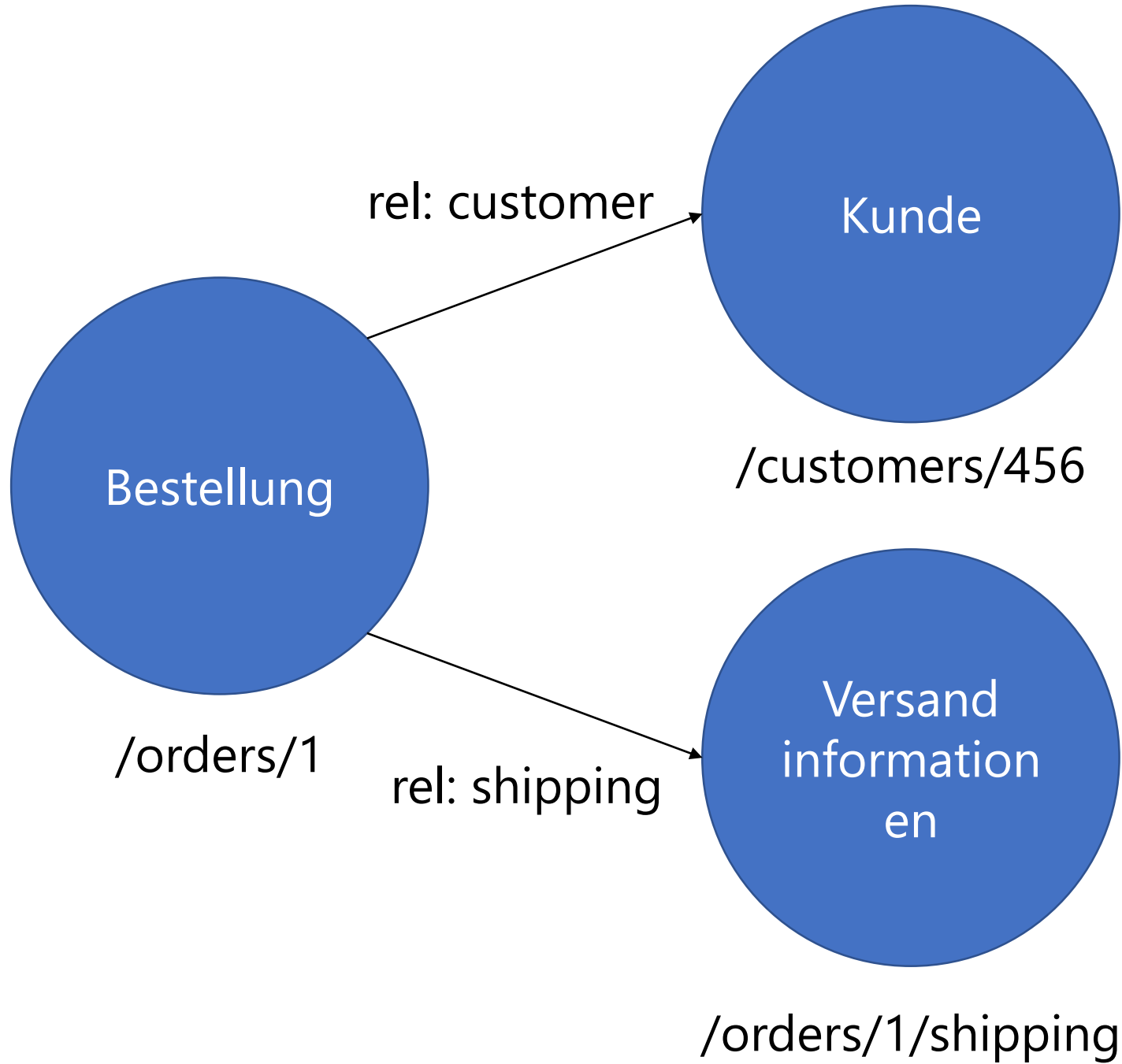
mehrere URLs,
mehrere HTTP-Methoden

mehrere URLs,
eine HTTP-Methode

eine URL,
eine HTTP-Methode

Hypermedia-Controls

- **Links:** Wo befindet sich eine Ressource, die mit der aktuellen in einer Beziehung steht?
- **Forms:** Wie manipulierte ich eine Ressource?



```
[  
  {  
    "givenName": "Florian",  
    "surname": "Gerlinghoff",  
    "residence": "Leipzig",  
    "details": "https://api.example.com/persons/1"  
  }  
]
```

```
"_templates": {
  "contacts": {
    "title": "Add Contact",
    "method": "post",
    "contentType": "application/json",
    "properties": [
      {
        "name": "surname",
        "required": true
      },
      {
        "name": "country",
        "default": "Germany"
      },
      {
        "name": "email",
        "regex":
          "/^(([^<>()\\[\\]\\\\.,;:\\s@\"']+)(\\.[^<>()\\[\\]\\\\.,;:\\s@\"']+)*|(\".+\"))@((\\[[0-9]{1,3}\\.([0-9]{1,3})\\.([0-9]{1,3})\\.([0-9]{1,3})\\]|([a-zA-Z\\-0-9]+\\.)+[a-zA-Z]{2,}))$/"
      }
    ]
  }
}
```

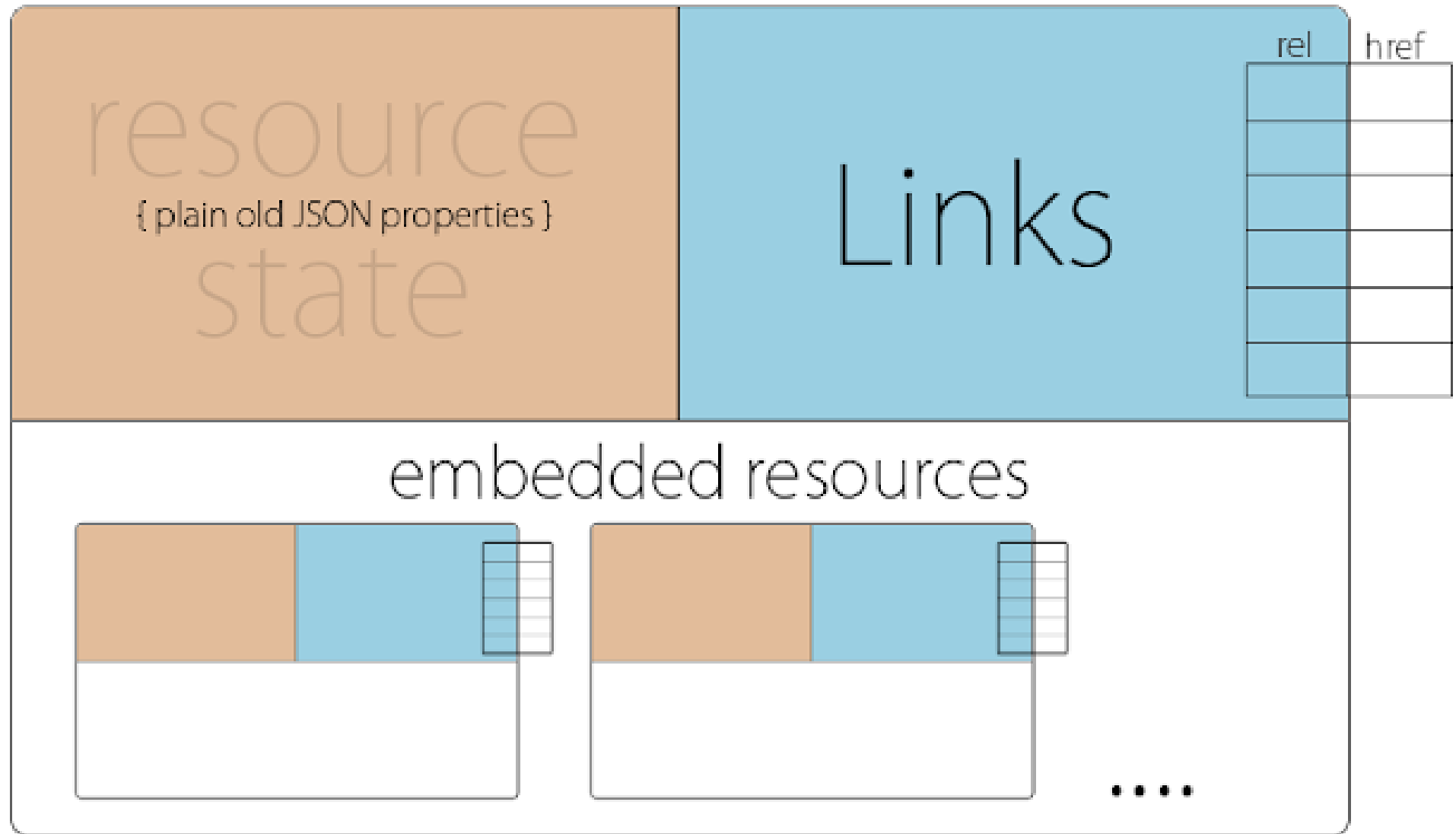
Alternative Media-Types

JSON ist als Media Type **ungeeignet**.

- keine Hypermedia Controls
- zu wenig beschränkt: Ist *link* eine URL oder ein normaler String, der zufällig aussieht wie eine?

```
{  
  "link" : "http://api.example.com/customers/1"  
}
```

Resource



```
{
  "currentlyProcessing": 14,
  "shippedToday": 20,

  "_links": {
    "self": { "href": "/orders" },
    "next": { "href": "/orders?page=2" },
    "search": {
      "href": "/orders{?id}",
      "templated": true
    }
  },
}
```



```
"_embedded": {
  "orders": [{
    "total": 30,
    "currency": "USD",
    "status": "shipped",
    "_links": {
      "self": { "href": "/orders/123" },
      "basket": { "href": "/baskets/98712" },
      "customer": { "href": "/customers/7809" }
    }
  }, {
    "total": 20,
    "currency": "USD",
    "status": "processing",
    "_links": {
      "self": { "href": "/orders/124" },
      "basket": { "href": "/baskets/97213" },
      "customer": { "href": "/customers/12369" }
    }
  }
]
}
```

Explorer

























Custom Request Headers

```
FOXY-API-VERSION: 1
Authorization: Bearer 61a7197472c9f9e4481f2d2f6a7d0352
```

Properties

```
{
  "message": "Welcome to the FoxyCart API! Our hope is to be as self-documenting and RESTful as possible. Please let us know if you have any questions by posting in our forum http://forum.foxycart.com or emailing us at helpdesk@foxycart.com. As a last resort, you could read the documentation at http://wiki.foxycart.com. Your first action should be to create an OAuth Client, then a user, followed by a store."
}
```

Links

rel	title	name	index	docs	GET	NON-GET
curies		/				
self	Your API starting point.	name:				
fx:property_helpers	Various helpers used for determining valid property values.	fx				
.../rels	Custom Link Relationships supported by this API.					
fx:reporting	The Reporting API Home.					
fx:encode	POST here to encode a body of html for use with our HMAC cart encryption.					
fx:user	Your API home page.					

Inspector

Response Headers

200 success

```
cache-control: private, must-revalidate
content-length: 2329
content-type: application/hal+json
date: Sun, 07 Apr 2019 06:24:49 GMT
etag: W/"0f01caac5ae00de9774ec5270ae508bff1676dfb"
server: nginx
vary: Accept
via: 1.1 e15344e351ae77fef306bf70353d7fc3.cloudfront.net (CloudFront)
x-amz-cf-id: HR2vujv0lgINPABaMhkYIQSzudFBH3b3jLuGsGwsTKfcd51Ihm3BRA==
x-cache: Miss from cloudfront
```

Response Body

```
{
  "_links": {
    "curies": [
      {
        "name": "fx",
        "href": "https://api.foxycart.com/rels/{rel}",
        "templated": true
      }
    ],
    "self": {
      "href": "https://api-sandbox.foxycart.com/",
      "title": "Your API starting point."
    },
    "fx:property_helpers": {
      "href": "https://api-sandbox.foxycart.com/property_helpers",
      "title": "Various helpers used for determining valid property values."
    },
    "https://api.foxycart.com/rels": {
      "href": "https://api-sandbox.foxycart.com/rels",
      "title": "Custom Link Relationships supported by this API."
    },
    "fx:reporting": {
```

```
// GET api.twitter.com
```

```
{  
  "uber": {  
    "version": "1.0",  
    "data": [  
      {"rel" : ["self"], "url" : "https://api.twitter.com/"},  
      {  
        "id": "users",  
        "rel" : ["collection", "https://api.twitter.c"],  
        "url" : "https://api.twitter.com/users"  
      },  
      {  
        "id": "statuses",  
        "rel" : ["collection", "https://api.twitter.com/rels/statuses"],  
        "url" : "https://api.twitter.com/statuses"  
      },  
      ..  
    ]  
  }  
}
```

URLs können verändert werden

```
// GET api.twitter.com/statuses
```

```
{  
  "uber": {  
    "version": "1.0",  
    "data": [  
      {"rel": ["self"], "url": "https://api.twitter.com/statuses"},  
      {  
        "name": "update",  
        "rel": ["https://api.twitter.com/rels/statuses/update"],  
        "url": "https://api.twitter.com/statuses/update",  
        "action": "append",  
        "sending": "application/json",  
        "model": "status={status}"  
      }  
    ]  
  }  
}
```

Parameter
können
verändert werden

```
// POST api.twitter.com/statuses/update
```

Mit Hypermedia ist es möglich,
anpassungsfähige Clients zu
entwickeln.

Nachteile

- aufwendiger, teurer
- wenig Tooling
- Performance?

Wann einsetzen?

- APIs mit Clients, die sich Businesslogik teilen
- gut skalierbare APIs
- Abbildung eines Workflows

Wie immer: There is no Silver Bullet.