

API-Management-Plattformen in der Cloud

Prof. Dr. Oliver Höß

Professor für Wirtschaftsinformatik und Leiter des Labors für Unternehmenssoftware
Hochschule für Technik Stuttgart

Karlsruhe, 21.5.2014

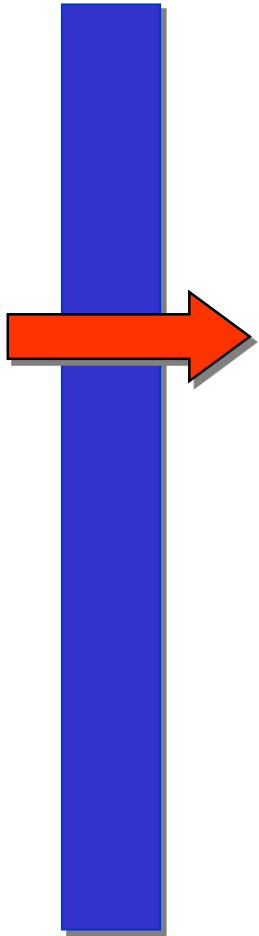
Hochschule
für Technik
Stuttgart

Web (g): www.hft-stuttgart.de

Web (p): www.oliver-hoess.de

Blog: www.innovative-trends.de

Gliederung



Einleitung / Die API Economy

Grundlagen API-Management-Plattformen in der Cloud

Einfaches Beispiel mit 3Scale

Zur Person

Hochschule
für Technik
Stuttgart

Hochschule für Technik Stuttgart (seit 2009)

- Professor für Wirtschaftsinformatik
- Leiter des Labors für Unternehmenssoftware



Fraunhofer IAO (bis 2009)

- Leiter MT Softwaretechnik
- Forschungs- und Beratungsprojekte

Innovative Trends
Innovative Themen und Trends rund um die IT

Innovative Trends (seit 2013)

- Betreiber des o.g. Blogs
- Innovative Trends und Themen rund um IT

Software is eating the world ...



„Software is eating the World“

- Marc Andreessen
- Gründer von Netscape und Investor
- Artikel von 2011 im Wall Street Journal



„APIs are eating Software“

- Steven Willmott
- CEO und Mitgründer von 3Scale
- Zitat aus unterschiedlichen Präsentationen



„Für Unternehmen / Plattformen wird das Anbieten (und Nutzen) von offenen Schnittstellen / APIs immer wichtiger“

- Oliver Höß, heute 😊

Die „API Economy“

The screenshot shows the ProgrammableWeb website interface. At the top, there is a navigation bar with links for API News, API Directory, For API Providers, For Developers, Listings, and Forum. The main content area features a large 'apigility by zend' logo with a cartoon elephant. Below the logo, there is a news article titled 'Zend Apigility Underscores API-First App Design' by Janet Wagner. A 'TRENDING' section lists topics like Oracle vs Google, JSON to CSV, Facebook, Weather, and Postman Review. The 'API NEWS' section highlights 'Three New APIs Now Available for the Turn Platform' by Turn (turn.com). Another article mentions 'Connect2Me Creates World First IoT Marketplace - But Is It Viable?'. On the right side, there is a 'Search API Directory' section with a search bar and a 'Browse by Category' menu. Below that is the 'PW Research Center' featuring a circular chart titled 'Fastest Growing Web API Categories' for the period '(6 Months Ended Dec 2013)'. At the bottom right, there is a 'Rate your API!' section with a 'SIGN UP NOW' button for a 'FREE FOREVER API MANAGEMENT SOLUTION'.

Über 11.000 registrierte APIs auf programmableweb.com
z.B. Social Networks, Geo APIs, Wetterdaten, ...

Beispiel: Die XING API

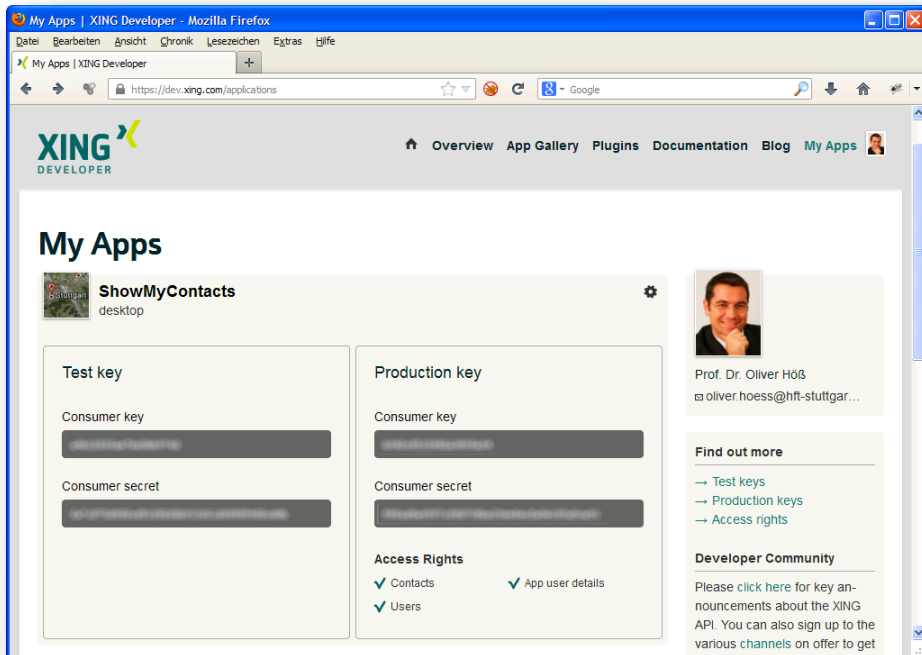
The screenshot shows the XING Developer website homepage. At the top, there is a navigation bar with links for Overview, App Gallery, Plugins, API, Meet Us, Blog, and My Apps. The main heading reads "You have the idea, we have the users." Below this, a sub-heading states "The XING API helps you connect your app with over 13 Million users." A prominent green button labeled "Learn more" is positioned below the text. The page features a large illustration of a human head with various icons (lightbulb, gears, network, mail, speech bubble, star, heart) connected to it, symbolizing ideas and connectivity. At the bottom, there are three columns of text: "Register your app" (Get a developer account and start developing right away!), "Explore the API" (Jump into the documentation and explore available calls), and "Join the Community" (Share knowledge, discuss ideas, and get the latest updates about the platform). A final section at the bottom encourages users to "Find out what others are doing with the API" by looking at examples of other developers' work.

Einstiegsseite: dev.xing.com

Anwendungsbeispiele: App Gallery

The screenshot displays the XING Developer App Gallery. The page features a grid of application cards. Each card includes a title, the developer's name, a brief description, and a "Learn more" link. The applications shown are: "Portal für XING" by informare Consulting GmbH (a powerful Windows 8 XING app for managing contacts and messages); "Cobook" by Cobook (a unified address book for Mac that syncs contacts from XING and other social networks); "XING app for HootSuite" by HootSuite (allows for post status updates to your network); "Promerit XING Connector" by Promerit (enables companies to post jobs on XING); "The XING Windows Phone App" by Zühlke (the official XING mobile app for Windows Phone); and "Competence Site" by NetSkill (a simple login via the new XING API). The page also features a navigation bar at the top and a sidebar on the right.

Beispiel: Die XING API



My Apps | XING Developer - Mozilla Firefox

My Apps | XING Developer

https://dev.xing.com/applications

XING DEVELOPER

Overview App Gallery Plugins Documentation Blog My Apps

My Apps

ShowMyContacts desktop

Test key

Consumer key

Consumer secret

Production key

Consumer key

Consumer secret

Access Rights

✓ Contacts ✓ App user details

✓ Users

Prof. Dr. Oliver Höß
oliver.hoess@hft-stuttgart...

Find out more

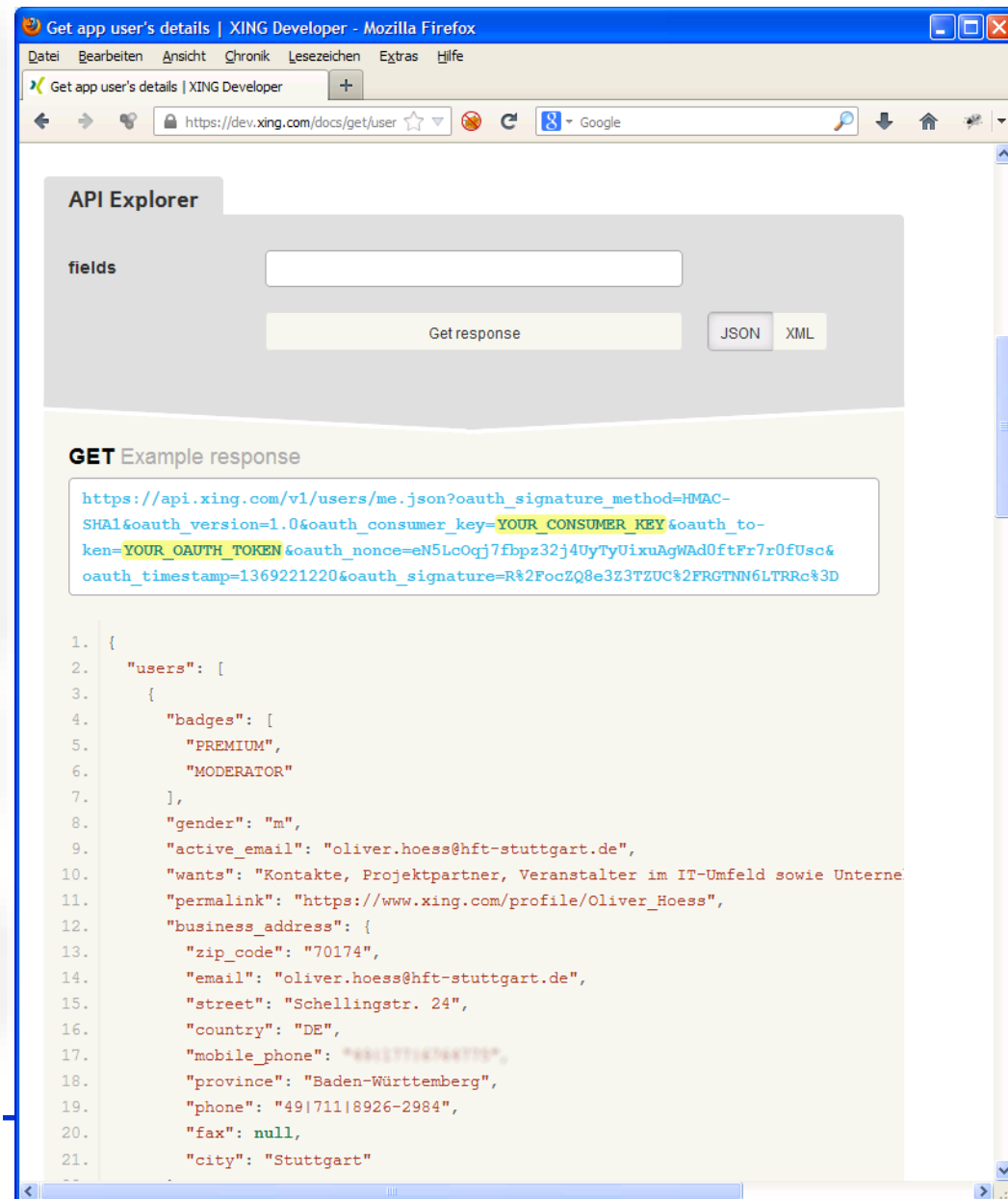
- Test keys
- Production keys
- Access rights

Developer Community

Please click here for key announcements about the XING API. You can also sign up to the various channels on offer to get

Abruf von Test- und Produktiv-Keys

Integrierte Test-Umgebung



Get app user's details | XING Developer - Mozilla Firefox

Get app user's details | XING Developer

https://dev.xing.com/docs/get/user

API Explorer

fields

Get response

JSON XML

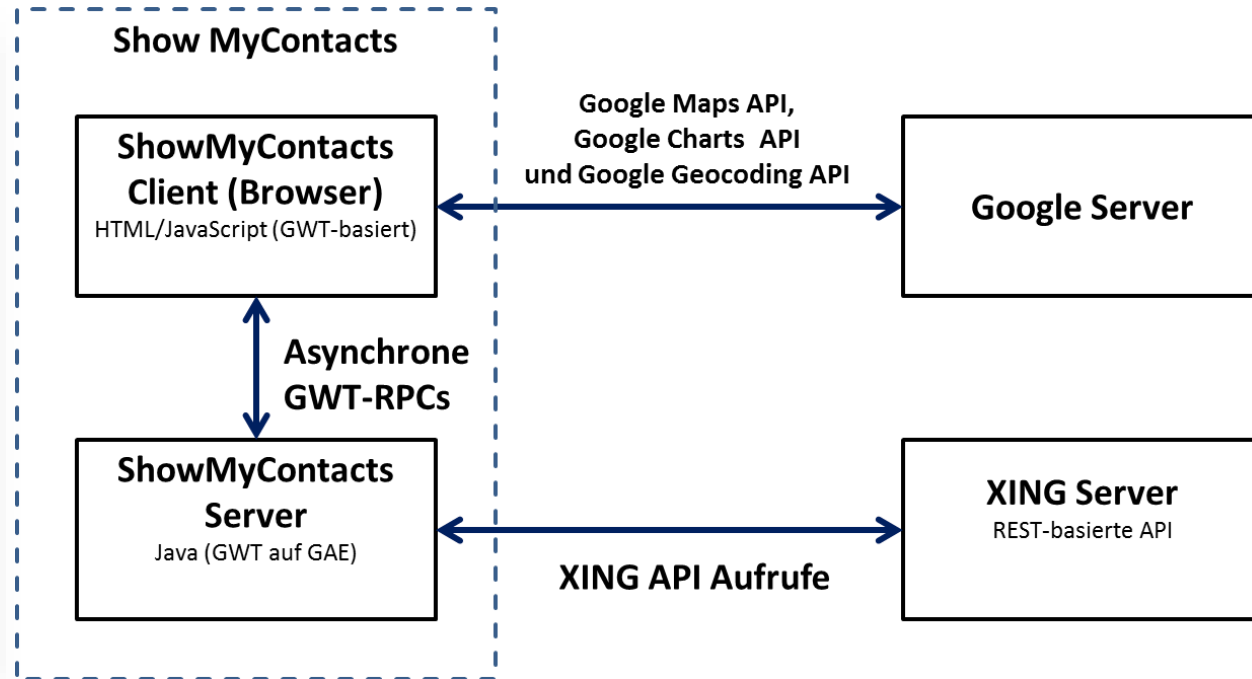
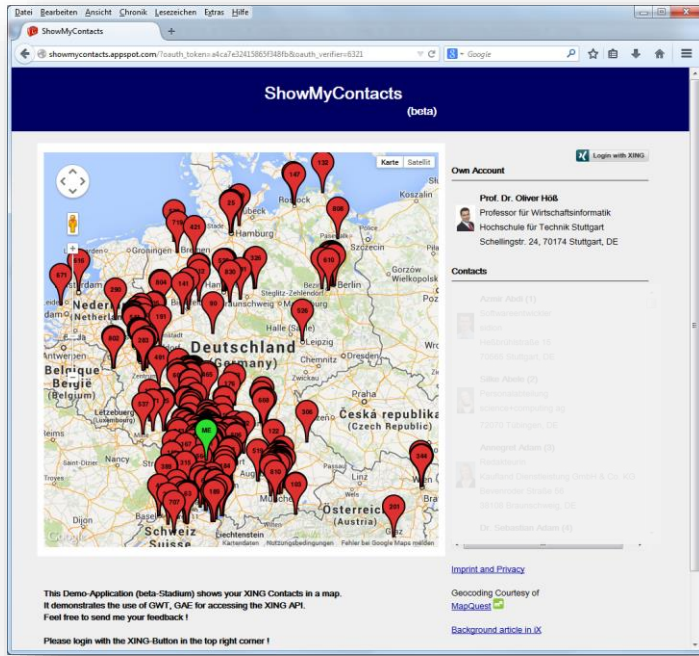
GET Example response

```
https://api.xing.com/v1/users/me.json?oauth_signature_method=HMAC-SHA1&oauth_version=1.0&oauth_consumer_key=YOUR_CONSUMER_KEY&oauth_token=YOUR_OAUTH_TOKEN&oauth_nonce=eN5LcOqj7Fbpz32j4UyTyUixuAgWAd0ftFr7r0fUsc&oauth_timestamp=1369221220&oauth_signature=R%2FocZQ8e3Z3TZUC%2FRGTNN6LTRRc%3D
```

```
1. {
2.   "users": [
3.     {
4.       "badges": [
5.         "PREMIUM",
6.         "MODERATOR"
7.       ],
8.       "gender": "m",
9.       "active_email": "oliver.hoess@hft-stuttgart.de",
10.      "wants": "Kontakte, Projektpartner, Veranstalter im IT-Umfeld sowie Unterne",
11.      "permalink": "https://www.xing.com/profile/Oliver_Hoess",
12.      "business_address": {
13.        "zip_code": "70174",
14.        "email": "oliver.hoess@hft-stuttgart.de",
15.        "street": "Schellingstr. 24",
16.        "country": "DE",
17.        "mobile_phone": "071416794779",
18.        "province": "Baden-Württemberg",
19.        "phone": "49|711|8926-2984",
20.        "fax": null,
21.        "city": "Stuttgart"

```

Nutzung der XING API: Beispiel ShowMyContacts



Showmycontacts.appspot.com
Visualisierung von XING-Kontakten in einer Google Map

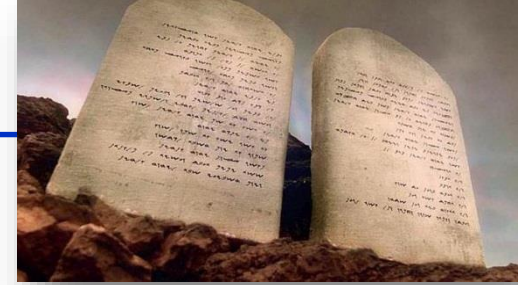
Beispiel: Springer API Portal



dev.springer.com

Entwicklerportal von
Springer, z.B. zum Abruf
von Metadaten zu
Publikationen

Grundbegriffe ...



API

- Application Programming Interface
- Im Web typischerweise mit RESTful-Services realisiert

API-Management

- Systematische Entwicklung und Evolution von APIs
- Nicht im Fokus dieses Vortrags: Design von APIs

API-Management-Plattform (AMP)

- Plattform zur Unterstützung der Bereitstellung von APIs
- Unternehmensintern oder im Web (Fokus)

API-Provider

- Anbieter einer API

API-Consumer

- Nutzer einer API (i.d.R. nicht der Endanwender)

Basis-Funktionen einer AMP

Authentifizierung/ Autorisierung

- Prüfung der Berechtigung des API-Consumers
- i.d.R. durch API-Keys (bei fortgeschrittenen Szenarios Oauth)

Key Management

- Die Zugriffs-Keys werden auf Basis der einzelnen API-Consumer verwaltet.

Nutzungspläne

- unterschiedliche Nutzungspläne (z.B. kostenlos vs. kostenpflichtig) mit unterschiedlichen Nutzungseigenschaften (z.B. unterschiedliche Quotas)

Monitoring / Accounting

- Die einzelnen Aufrufe werden auf API- bzw. Operationsbasis den API-Consumern zugerechnet und können abgerufen / ausgewertet werden.

Quotas / Throttling

- Aufrufgrenzen für unterschiedliche Zeiteinheiten (von Sekunden bis Monate)
- Bei Erreichung der Limits: Abweisen / verzögert behandeln (Throttling).

Preismodelle / Billing

- Bei Monetarisierung: Definition von Preismodellen / Zahlmechanismen

Funktionen des Entwicklerportals

Integriertes CMS

- Anpassung nach eigenen Wünschen durch API Provider

Self-Service Registrierung und Verwaltung

- Reduktion des Aufwands für den Provider, da sich die Consumer selbst verwalten (z.B. Keys / Einstellungen)

Graphisches Monitoring

- Komfortable graphische Analyse der API-Aufrufe durch Provider und Consumer nach verschiedenen Kriterien

Interaktive API-Dokumentation & Test

- Die API kann durch den Consumer interaktiv getestet werden

Community / Forum

- Kontakt zwischen Provider und Consumer (oder untereinander)

Die Qual der Wahl



Eigenentwicklung

- Hoher Aufwand
- Fragwürdige Qualität
- Warum das Rad neu erfinden ?

On-Premise-Lösung

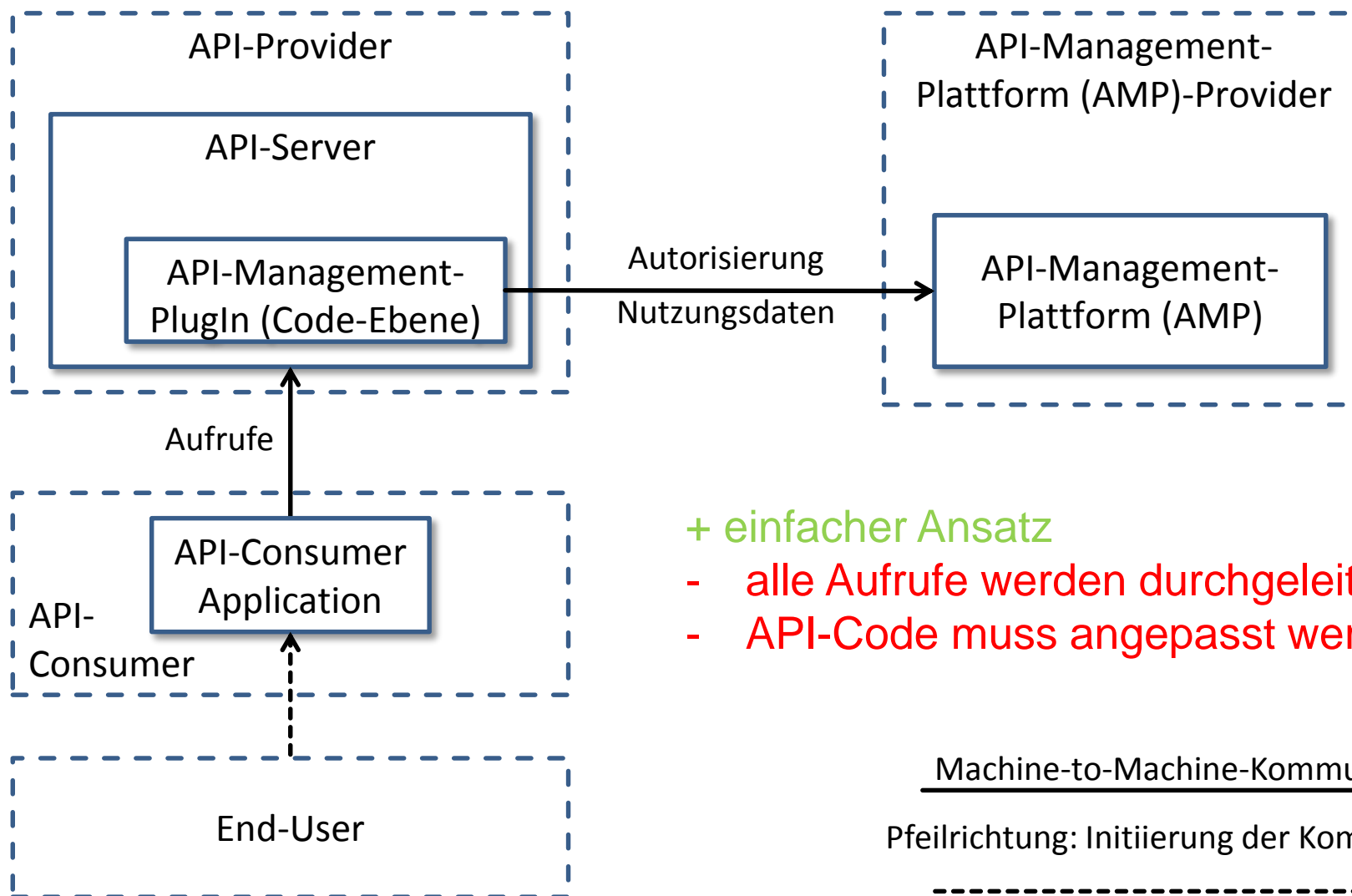
- Produkte am verfügbar
- Eigene Installation & Betrieb

On-Demand-Lösung

- Plattformen verfügbar
- Betrieb in der Cloud
- Einfache Nutzung



Integration: PlugIn-Ansatz



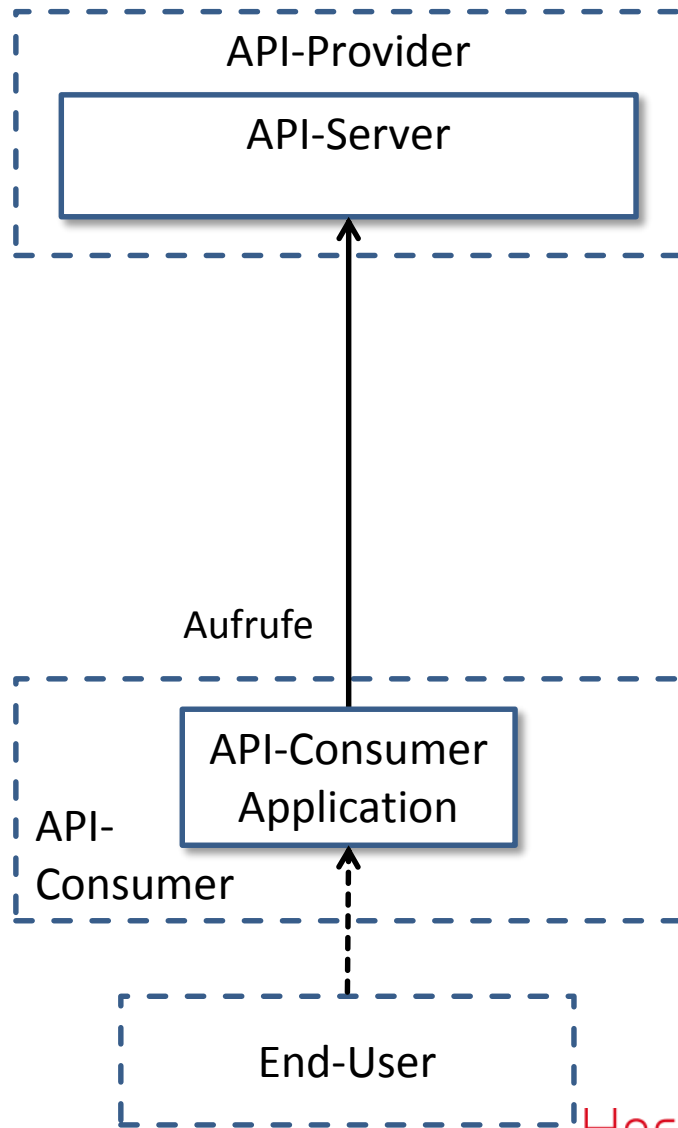
- + einfacher Ansatz
- alle Aufrufe werden durchgeleitet
- API-Code muss angepasst werden

Machine-to-Machine-Kommunikation →

Pfeilrichtung: Initiierung der Kommunikation

----->
Bedienung über eine Benutzungsschnittstelle

Integration: Proxy-Ansatz



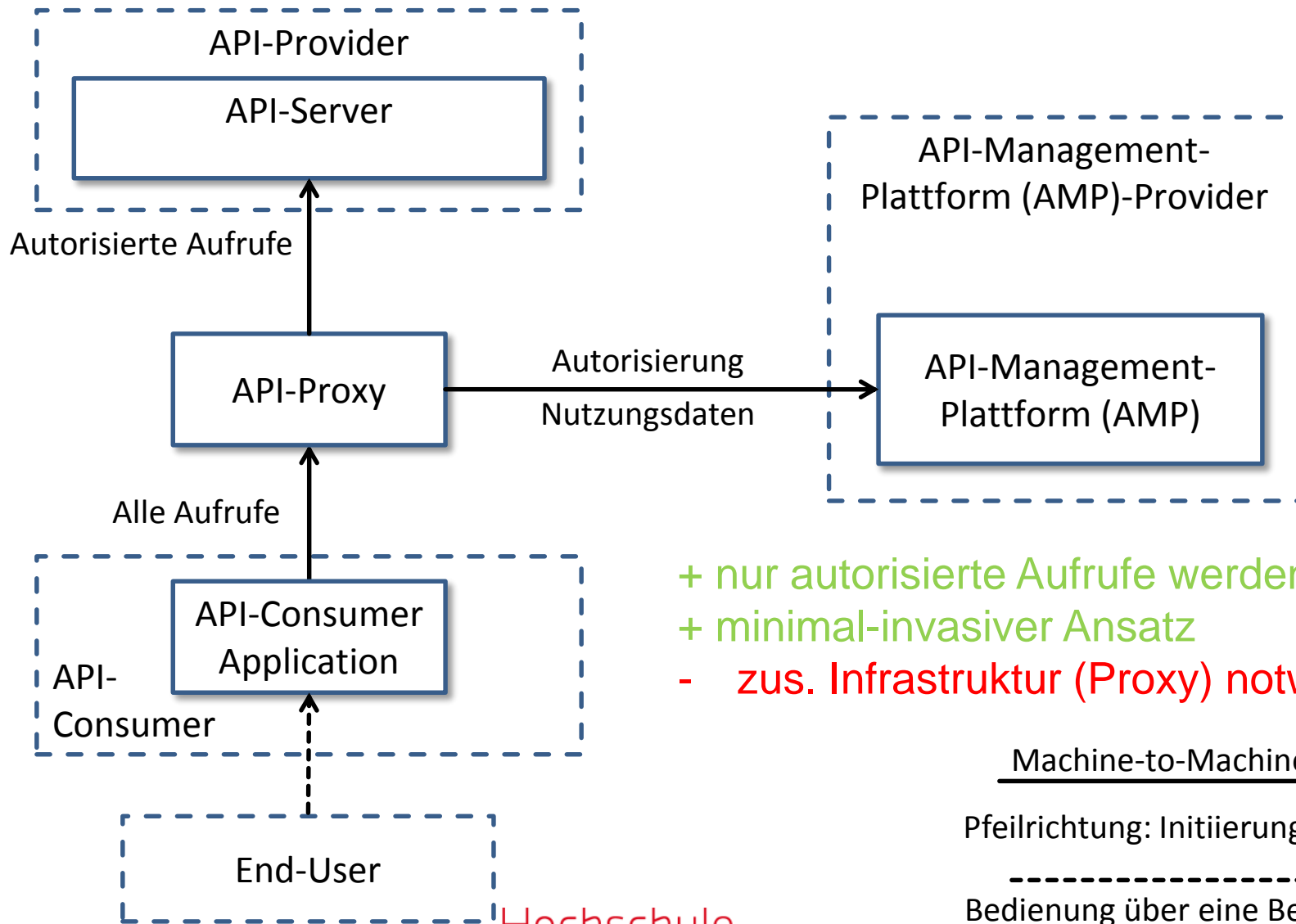
Machine-to-Machine-Kommunikation →

Pfeilrichtung: Initiierung der Kommunikation

----->

Bedienung über eine Benutzungsschnittstelle

Integration: Proxy-Ansatz



- + nur autorisierte Aufrufe werden durchgeleitet
- + minimal-invasiver Ansatz
- zus. Infrastruktur (Proxy) notwendig

Machine-to-Machine-Kommunikation →

Pfeilrichtung: Initiierung der Kommunikation

----->
Bedienung über eine Benutzungsschnittstelle

3Scale Beispiel: Minimale Beispiel-API

```
// Simple demo API for the Google App Engine using Google Cloud Endpoints
// for generating a REST/JSON service
// Example Call: https://oh-test-api.appspot.com/_ah/api/example/v1/product/4711

package de.oh.testservice;    // Imports left out

@Api(name = "example", description = "This API handles products")
public class ProductServiceImplementation {

    @ApiMethod
    public Product getProduct(@Named("id") int id) throws NotFoundException {
        Product p = products.get(new Integer(id));
        if (p == null) {
            throw new NotFoundException("Product with ID " + id + " not
            found!");
        } else
            return p;
    }

    // Small rest of code (initialization etc.)
    // is left out
}
```

Output:

```
{
  "productId": 4711,
  "numberInStock": 42,
  "productName": "Harddisk 1TB"
}
```

3Scale: Registrierung

The screenshot shows the 3Scale website homepage. At the top, there is a navigation bar with the 3Scale logo, a search bar, and a menu with items: THE API ECONOMY, PRODUCT, PRICING, CUSTOMERS, RESOURCES, BLOG, SUPPORT, and a Login button. The main heading is "Out-of-the-Box API Management". Below this, a sub-heading reads: "Package, Manage, Distribute and Monetize your APIs with 3scale API Management platform capabilities delivered as-a-service, out-of-the-box." A carousel slide below states: "3scale supports more than 250 APIs of all sizes from Startups to Fortune 500 Companies" and features logos for Skype, musicmatch, U.S. DEPARTMENT OF ENERGY, SYNC (A 6SI US COMPANY), and Nviso DEVELOPERS PLATFORM. A rocket graphic is on the right side of the carousel. Below the carousel, there are two buttons: "SIGNUP NOW - FREE!" and "OR Request a Demo". The footer contains three columns: "Mobile Enablement" with a smartphone icon, "Partner Ecosystem" with a handshake icon, and "Internal Innovation" with a lightbulb icon. Each column has a brief description and a "Learn more" link.

3Scale: Sandbox-Proxy einrichten



Dashboard Accounts Applications Finance Monitoring **API** CMS Settings

API Active Docs Account Plans

Service 'API' > Integration

Integration

Settings

Naming

Alerts

Application plans

End user plans

3scale offers you total flexibility to integrate with your API. You can choose between code plugins (for almost any language, including a REST interface) or an open-source proxy that can be configured using a graphical interface.

⚙️ Plugin

📦 Proxy

Configure your API Proxy and run it on premise or in our sandbox. Please see the [API Proxy Howto](#) for more details.

Your API backend*

Private address of your API. It will be called by the proxy.

Hostname rewrite

Host HTTP header of the calls, required if API backend is hosted. See the [Proxy HowTo](#).

Sandbox endpoint*

Public address of your API proxy. Developer will use this address to call the API

Sandbox proxy is

ON

Deployed at 2013-08-20 17:13:31 UTC. [See the history](#).

▼ Mapping Rules [?](#)

Rule	Pattern	+/-	+	Create Proxy Rule
GET	<input type="text" value="/_ah/api/example/v1/product"/>	1	getProduct	<input type="text"/> <input type="text"/>

▶ Advanced Settings

Download Nginx Config

Save & Deploy

Save

3Scale: Metriken / Application Plans definieren



Dashboard Accounts Applications Finance Monitoring **API** CMS Settings

API Active Docs Account Plans

Service 'API' >

Integration

Settings

Naming

Alerts

Application plans

End user plans

Edit Application Plan 'Default'

Name*

System name*

Applications require approval?

Set whether or not applications can be created on demand or if approval is required from you before they are activated.

Update Application plan

Metrics

Name	Enabled ?	Visible ?	Text only ?	+ New metric	
Hits	Limits (0) + New method ?	✓	✓	✓	Edit
Get a product by its ID	Limits (2)	✓	✓	✓	Edit Delete
Usage Limits ?				+ New usage limit Close	
Period	Value				
1 minute	5			Edit Delete	
1 day	1000			Edit Delete	

Demo API-Portal

The screenshot shows a web browser window with the address bar displaying `https://oh-test-api-portal.3scale.net`. The page title is "Demo API Developer Portal" and it is powered by 3scale. The navigation bar contains buttons for "Sign In", "Active Docs", "Help", and "Forum". The main content area greets the user and provides information about the API Developer Portal, including a sign-up prompt. The footer contains the copyright notice "© 2014" and the 3scale logo.

Adresse:
<https://oh-test-api-portal.3scale.net/>

3Scale: Demo API-Portal: Sicht API-Consumer

Powered by  3scale

[Sign In](#)

[Active Docs](#)

[Help](#)

[Forum](#)

[Search](#)

Application: Default

Default application

Application ID

This is the application ID, you should send with each API request.

d24a7791

Application Keys

These are application keys used to authenticate requests.

[Create new key](#)

7390e28f0734bedbbf6612640277c26b

Properties

State live

[Edit](#)

Plan: Default ([Review/Change](#))

To extend your limits please [contact us](#).

Dashboard

[Overview](#)

[API Access Details](#)

[Change Plan](#)

[Messages](#)

[Stats](#)

3Scale: Interaktive Testumgebung auf Basis der Swagger Spezifikation

Demo API Developer Portal

TestUser1 [Dashboard](#) | [Account](#) | [Logout](#)

Powered by  3Scale

[Sign In](#)

[Active Docs](#)

[Help](#)

[Forum](#)

API Docs

Here you have an interactive documentation of the Test-API based on the Swagger standard, enhanced by 3Scale.

Also you can test the API by supplying the necessary parameters.

Operations

Store API Spec

Get a product by its ID

`/_ah/api/example/v1/product/{id}` **GET**

Implementation Notes

Get a product by its ID

PARAMETER	VALUE	DESCRIPTION
id	<input type="text" value="4711"/>	the id of the product, for test use 4711 or 4712
app_id	<input type="text" value="d24a7791"/>	Your access application id
app_key	<input type="text" value="7390e28f0734bedbb"/>	Your access application key

[HIDE RESPONSE](#)

Request


```
curl -v -X GET "http://api.2445580373092.proxy.3scale.net/_ah/api/example/v1/product/4711?app_id=d24a7791&app_key=7390e28f0734bedbbf6612640277c26b"
```

Response Body

```
{
  "productId": 4711,
  "numberInStock": 42,
  "productName": "Festplatte 1TB",
  "kind": "example#productServiceImplementationItem",
  "etag": "\"\\\"gLa50vP9ofFbnx5X_giNqxNVH0/ooamlwUHv4z_R8evDknWmI3cRkw\\\"\""
}
```


3Scale: Interaktive Testumgebung auf Basis der Swagger Spezifikation

Demo API Developer Portal TestUser1 [Dashboard](#) | [Account](#) | [Logout](#)

Powered by  3Scale

[Sign In](#) [Active Docs](#) [Help](#) [Forum](#)

API Docs

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Operations

Store API Spec

Get a product by its ID /_ah/api/example/v1/product/{id}

Request

```
curl -v -X GET "http://api.2445580373092.proxy.3scale.net/_ah/api/example/v1/product/4711?app_id=d24a7791&app_key=7390e28f0734bedbbf6612640277c26b"
```

Response Body

```
{
  "productId": 4711,
  "numberInStock": 42,
  "productName": "Festplatte 1TB",
  "kind": "example#productServiceImplementationItem",
  "etag": "\"gLGaSOvP9ofFbnx5x_giNxqNVH0/ooamlwUHv4z_R8evDknWmI3cRkw\""
}
```

Swagger Spezifikation (I)

```
{
  "apiVersion": "1.0",
  "swaggerVersion": "1.1",
  "basePath": "http://api.2445580373092.proxy.3scale.net",
  "resourcePath": "/_ah/api/example/v1/product",
  "apis": [
    {
      "path": "/_ah/api/example/v1/product/{id}",
      "description": "Operations on products",
      "operations": [
        {
          "httpMethod": "GET",
          "notes": "Get a product by its ID",
          "nickname": "getProduct",
          "summary": "Get a product by its ID",
          "parameters": [
            {
              "name": "id",
              "description": "the id of the product, for test use 4711 or 4712",
              "dataType": "int",
              "required": true,
              "allowMultiple": false,
              "paramType": "path"
            }
          ]
        }
      ]
    }
  ]
}
```

Swagger Spezifikation (II)

```
{
  {
    "name": "app_id",
    "description": "Your access application id",
    "dataType": "string",
    "paramType": "query",
    "threescale_name": "app_ids"
  },
  {
    "name": "app_key",
    "description": "Your access application key",
    "dataType": "string",
    "paramType": "query",
    "threescale_name": "app_keys"
  }
],
"errorResponses": [
]
}
]
}
}
```

Näheres zu Swagger:
<http://developers.helloverb.com/swagger>

3Scale: Monitoring



Dashboard Accounts Applications Finance **Monitoring** API CMS Settings

Analytics Traffic Errors

Stats for service 'API' Back

Stats

Usage

Top Applications

Hours of day

Days of week

Alerts

Request Log

API Usage 9 hits

Metrics

Methods

Year

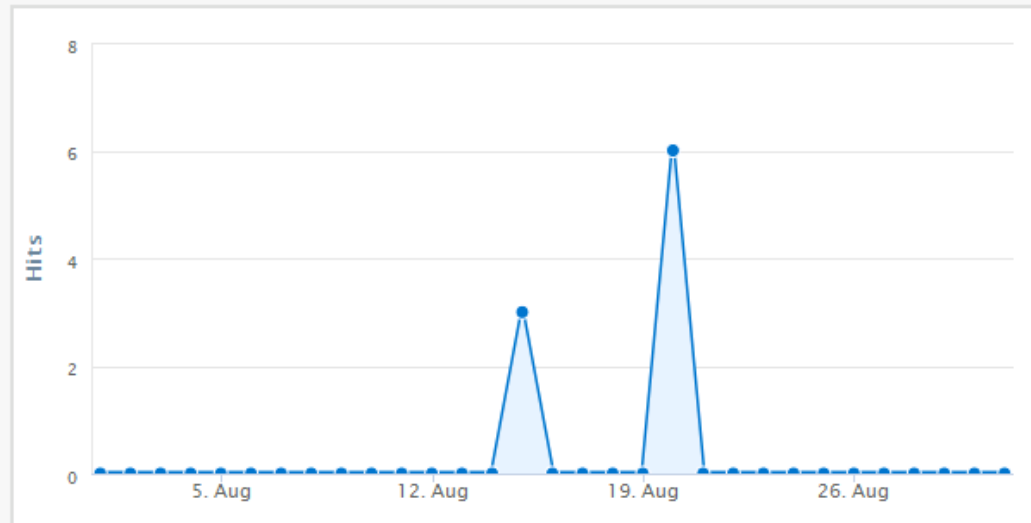
Month

Week

Day

Hits

1 Aug



Methods

[Get a product by its ID](#)

5 hits

Using time zone (GMT+00:00) UTC

[Download CSV](#)

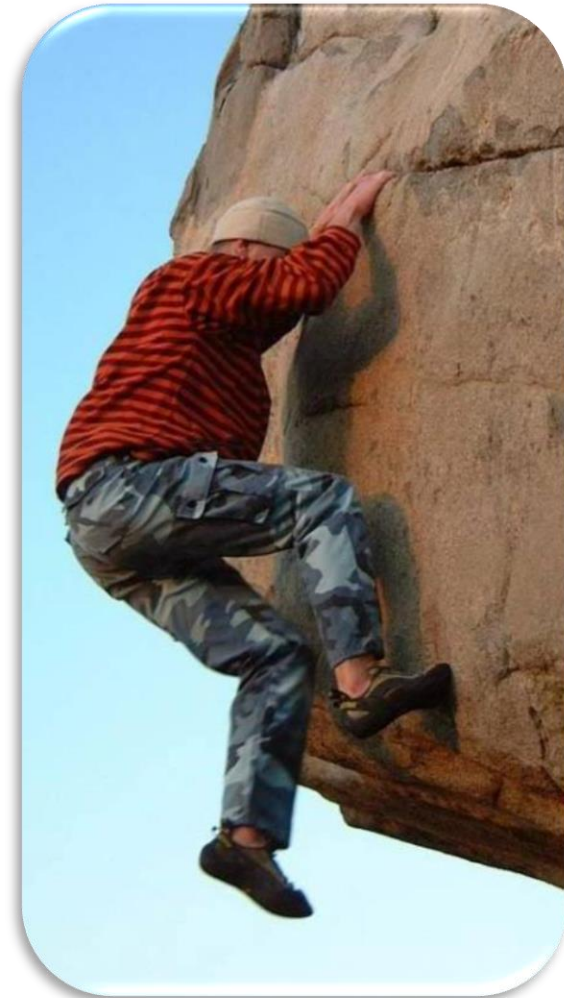
Fazit

Es gibt einige Hürden bei der Bereitstellung einer API zu lösen ...

Die Eigenentwicklung einer API-Management-Plattform mit den Standard-Funktionalitäten ist ein umfangreiches Unterfangen.

Es sollte auf Standard-Produkte / Plattformen zurückgegriffen werden !

Cloud Plattformen sind für einen einfachen Einstieg gut geeignet !



Weitere Informationen

REPORT | WEB-SCHNITTSTELLEN

Cloud-Plattformen zum Bereitstellen
und Verwalten von Web-APIs



Mit Anschluss

Oliver Höß, Jürgen Falkner,
Anette Weisbecker

auf dem
finden. I
verdiene
die Rede
und Beza
Ein g
Konzept
Netzwer
rer iX-A
tet über s
trag Test
man die
gene Pro
hält man
umfangr
Commun

Die Qu
beim B

Wer eine
stellen n
Wege:
– Man
Funktio
in der R
fangs zu
ausuferr
malfall n
– Die Er
On-Pre
eigenen
den Ant
er 7, W
Links“).
zudem in

Artikel in iX 6/2014

Mit Anschluss

Cloud-Plattformen zum
Bereitstellen und Verwalten von
Web-APIs

Erscheint am 28.5.2014

Vielen Dank für die Aufmerksamkeit !

