

Building, Running and Promoting a Public API

Ben Barnard & Felix Leipold

here

18 October 2013

Building

Extensibility

Tools & Docs

Scala

Running

Design Evolution

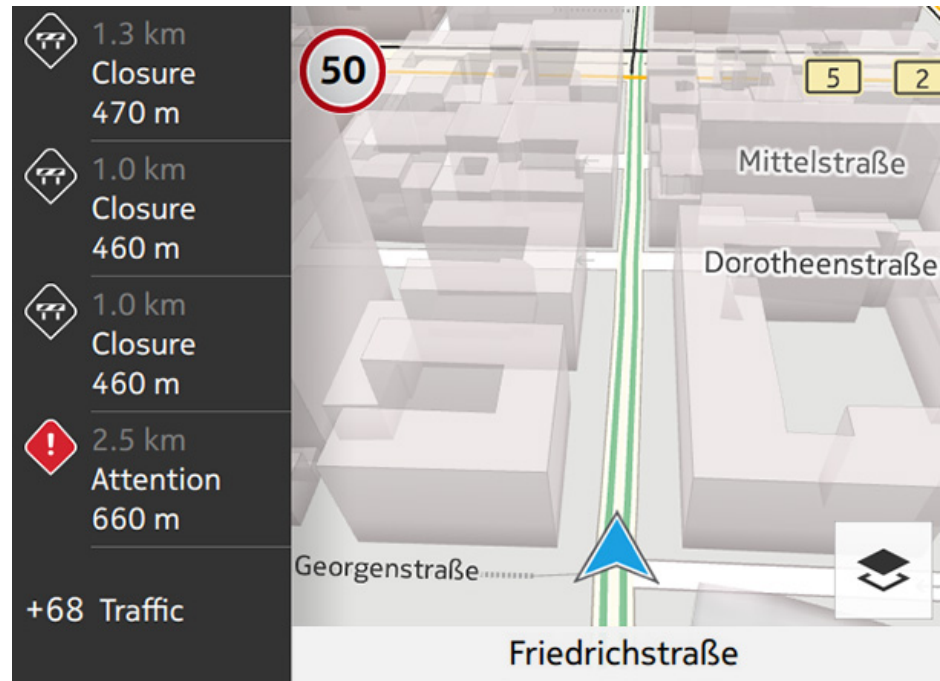
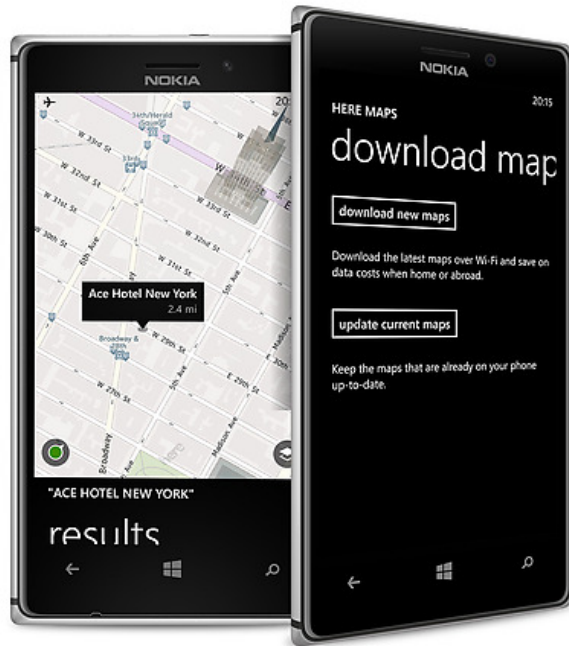
Tools for

Troubleshooting

Promoting

Tools for Client
Devs

here



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1 to 3 of 3

**Estrel Hotel**[More details](#)

Sonnenallee 225
12057 Berlin
Germany

★★★★★

[Collect](#)[Get directions](#)**Estrella del Norte**[More details](#)

Av. Juan Hormaechea
Plaza de Quejo, 39195, Spain

★★★★★

[Collect](#)[Get directions](#)**Serra da Estrela**[More details](#)

E 802
Penhas da Saúde, Penhas da
Saúde, 6200
Portugal

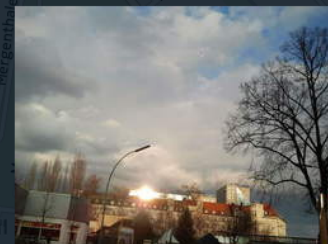
★★★★★

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2 nights B&B

[All Berlin offers](#)[Map view](#)[Features](#)**Estrel Hotel**

Hotel



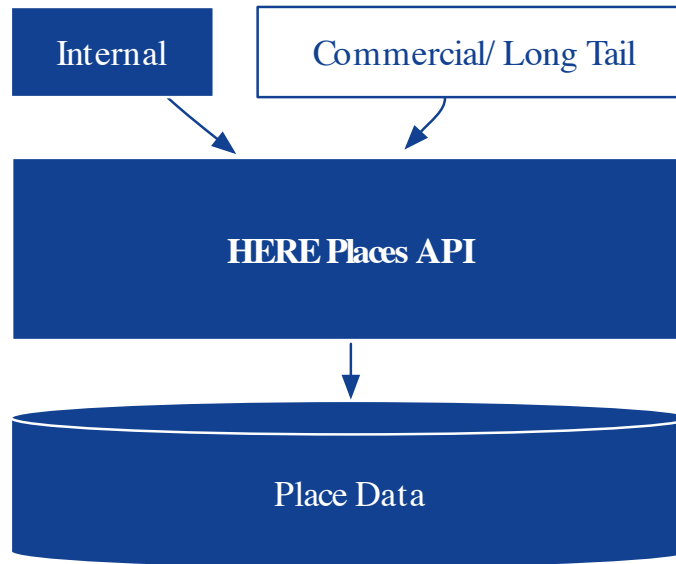
Sonnenallee 225
12057 Berlin
Germany
+493068310

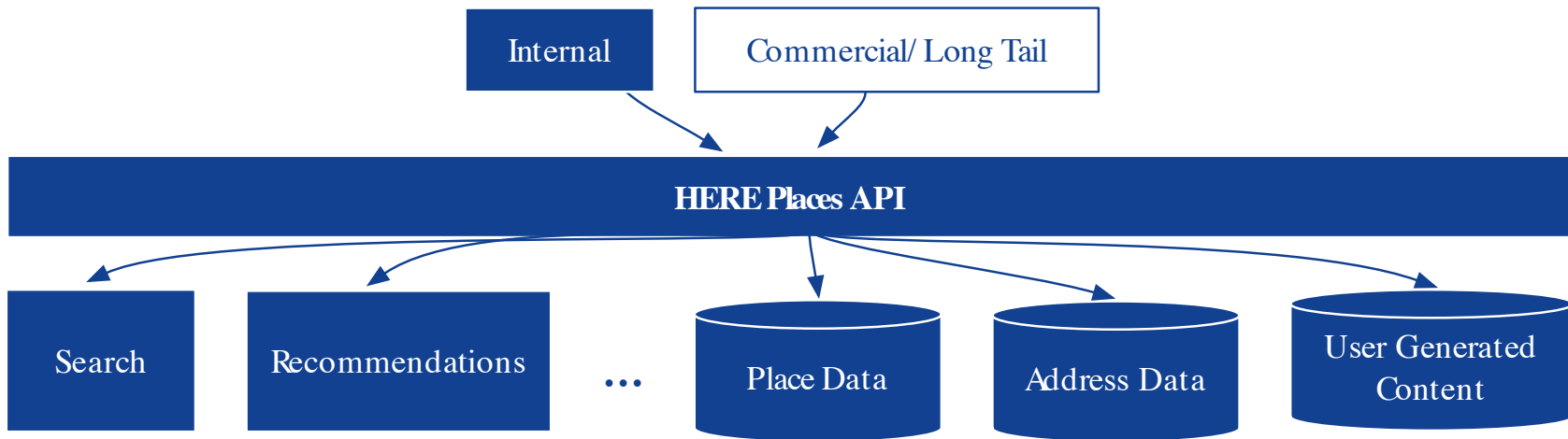
[More details](#)
[Zoom in](#)

★★★★★ (63)

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200 m





GET /places/v1/discover/search?at=52.5515%2C13.4039&q=restaurant&... HTTP/1.1

Host: places.demo.api.here.com

Accept: application/json

Accept-Language: en-US,en;q=0.5

HTTP/1.1 200 OK

Cache-Control: no-store, must-revalidate

Content-Language: en

Content-Type: text/html; charset=UTF-8

Expires: Thu, 26 Apr 1970 20:00:00 GMT

Pragma: no-cache

Connection: keep-alive

{"results":{"next":"http://places...","items":[...] }, ...} // a very long line!

Browser Plugin

```

{
- results: {
  next: http://places.demo.api.here.com/places/v1/discover/search;context=ZmxvdylpZD04ZmI4YzAzZS05OGMzLTUyNDktYTFFiYi00MGRmODVlZDI5MDVfMTM4MTY4Nzc5NjAwOF8wXzQ1OTkmb2Zmc2V0PTU?aapp\_code=NYKC67ShPhQwgaydGIW4yg&at=52.5515%2C13.4039&q=restaurant&size=5,
- items: [
  - {
    - position: [
      52.551182,
      13.40434
    ],
    distance: 46,
    title: "- Blaumilchkanal - Schaffer & Sährig",
    averageRating: 0,
    - category: {
      id: "restaurant",
      title: "Restaurant",
      href: http://places.demo.api.here.com/places/v1/categories/places/restaurant?app\_id=demo\_qCG24t50dH0wrLQ&aapp\_code=NYKC67ShPhQwgaydGIW4yg,
      type: "urn:nlp-types:category"
    },
    icon: http://download.vcdn.nokia.com/p/d/places2/icons/categories/03.icon,
    vicinity: "Schivelbeiner Straße 23  
10439 Berlin  
Germany",
    having: [ ],
    type: "urn:nlp-types:place",
    href: http://places.demo.api.here.com/places/v1/places/276u33dc-6f472700559a45caa476eld95aef1608;context=ZmxvdylpZD04ZmI4YzAzZS05OGMzLTUyNDktYTFFiYi00MGRmODVlZDI5MDVfMTM4MTY4N;aapp\_code=NYKC67ShPhQwgaydGIW4yg,
    id: "276u33dc-6f472700559a45caa476eld95aef1608"
  },
  + { ... },
  + { ... },
  + { ... },
  + { ... }
]
},
+ search: { ... }
}

```

Content Negotiation

```
{
- results: {
  next: http://places.demo.api.here.com/places/v1/discover/search;context=ZmxvdylpZDlkNmY5MDJ...
- items: [
- {
  - position: [ 52.551182 , 13.40434 ]
    distance: 46
    title: - Blaumilchkanal - Schaffer & Sährig
    averageRating: 0.0
+ category: { Restaurant }
    icon: http://download.vcdn.nokia.com/p/d/places2/icons/categories/03.icon
    vicinity: Schivelbeiner Straße 23<br/>10439 Berlin<br/>Germany
- having: [ ]
    type: urn:nlp-types:place
    href: http://places.demo.api.here.com/places/v1/places/276u33dc-6f472700559a45caa476e1d9...
    id: 276u33dc-6f472700559a45caa476e1d95aef1608
  } ,
+ { Phuoc Asien Küche }
+ { Belleville Creperie Cafe Bar }
+ { Belleville }
+ { Masopust's 1. Österreichisches Heurigenlokal in Berlin }
]
}
+ search: {...}
}
```

Tweaking the Request

Request:

Find places using a text query.

[Open the full Search documentation.](#)

URL parameters

at ☒

q ☒

size ☒

tf ☐

result_types ☐

HTTP headers

X-Map-Viewport ☐

Geolocation ☐

X-Mobility-Mode ☐

Tweaking on the Console

Take this request home

```
curl \
  --compressed \
  -H 'Accept-Encoding:gzip' \
  --get 'http://places.demo.api.here.com/places/v1/discover/search' \
  --data-urlencode 'app_code=NYKC67ShPhQwqaydGIW4yg' \
  --data-urlencode 'app_id=demo_qCG24t50dHOwrlQ' \
  --data-urlencode 'at=52.5515,13.4039' \
  --data-urlencode 'pretty=true' \
  --data-urlencode 'q=restaurant' \
  --data-urlencode 'size=5'
```

places.demo.api.here.com/places/v1/discover/search?at=52.5515%2C13.4039&q=restaurant&size=5&app_code=NYKC67ShPhQwqaydGIW4yg&app_id=d...

RESTful Places

Quick StartDocumentationDeveloper Forum+ App credentials

Request: /places/v1/discover/search

Find places using a text query.

Open the full Search documentation.

URL parameters

at

☒ 52.5515,13.4039

q

☒ restaurant

size

☒ 5

tf

☐ html

result_types

☐ place

HTTP headers

X-Map-Viewport

☐

Geolocation

☐

X-Mobility-Mode

☐ walk

Search

Take this request home

curl \

--compressed \

-H 'Accept-Encoding:gzip' \

--get 'http://places.demo.api.here.com/places/v1

--data-urlencode 'app_code=NYKC67ShPhQwqaydGIW

--data-urlencode 'app_id=demo_qCG24t50dHOWrLQ'

--data-urlencode 'at=52.5515,13.4039' \

--data-urlencode 'pretty=true' \

--data-urlencode 'q=restaurant' \

--data-urlencode 'size=5'

Response:

+ Alternative view

{

- results: {

next: http://places.demo.api.here.com/places/v1/discover/search;context=ZmxvdylpZD1kNmY5MDJ...

- items: [

- {

- position: [52.551182 , 13.40434]

distance: 46

title: - Blaumilchkanal - Schaffer & Sährig

averageRating: 0.0

+ category: { Restaurant }

icon: http://download.vcdn.nokia.com/p/d/places2/icons/categories/03.icon

vicinity: Schivelbeiner Straße 23
10439 Berlin
Germany

- having: []

type: urn:nlp-types:place

href: http://places.demo.api.here.com/places/v1/places/276u33dc-6f472700559a45caa476e1d9...

id: 276u33dc-6f472700559a45caa476e1d95aef1608

},

+ { Phuoc Asien Küche }

+ { Belleville Creperie Cafe Bar }

+ { Belleville }

+ { Masopust's 1. Österreichisches Heurigenlokal in Berlin }

]

}

+ search: {...}

}

Example Search Response

```
- {  
  - position: [ 48.87626 , 2.29511 ]  
    distance: 883420  
    title: Guy Savoy  
    averageRating: 5.0  
  + category: { Restaurant }  
    icon: http://download.vcdn.nokia.com/p/d/places2/icons/categories/03_02.icon  
    vicinity: 18 Troyon Rue<br/>75017 Paris<br/>France  
  - having: [ owner ]  
    type: urn:nlp-types:place  
    href: http://places.demo.api.here.com/places/v1/places/250u09tf-2d02373669f94ad290352ee0...  
    id: 250u09tf-2d02373669f94ad290352ee0310d494d  
  } ,  
- {  
  - position: [ 48.87168 , 2.31448 ]  
    distance: 882481  
    title: 114, Faubourg  
    averageRating: 0.0  
  + category: { Restaurant }  
    icon: http://download.vcdn.nokia.com/p/d/places2/icons/categories/03_02.icon  
    vicinity: 114 Faubourg Saint-Honoré Rue du<br/>75008 Paris<br/>France  
  - having: [ owner ]  
    type: urn:nlp-types:place  
    href: http://places.demo.api.here.com/places/v1/places/250u09wh-4389625384c5475c9751a541...  
    id: 250u09wh-4389625384c5475c9751a5416b44051a  
  } ,
```

The Case for Extensibility

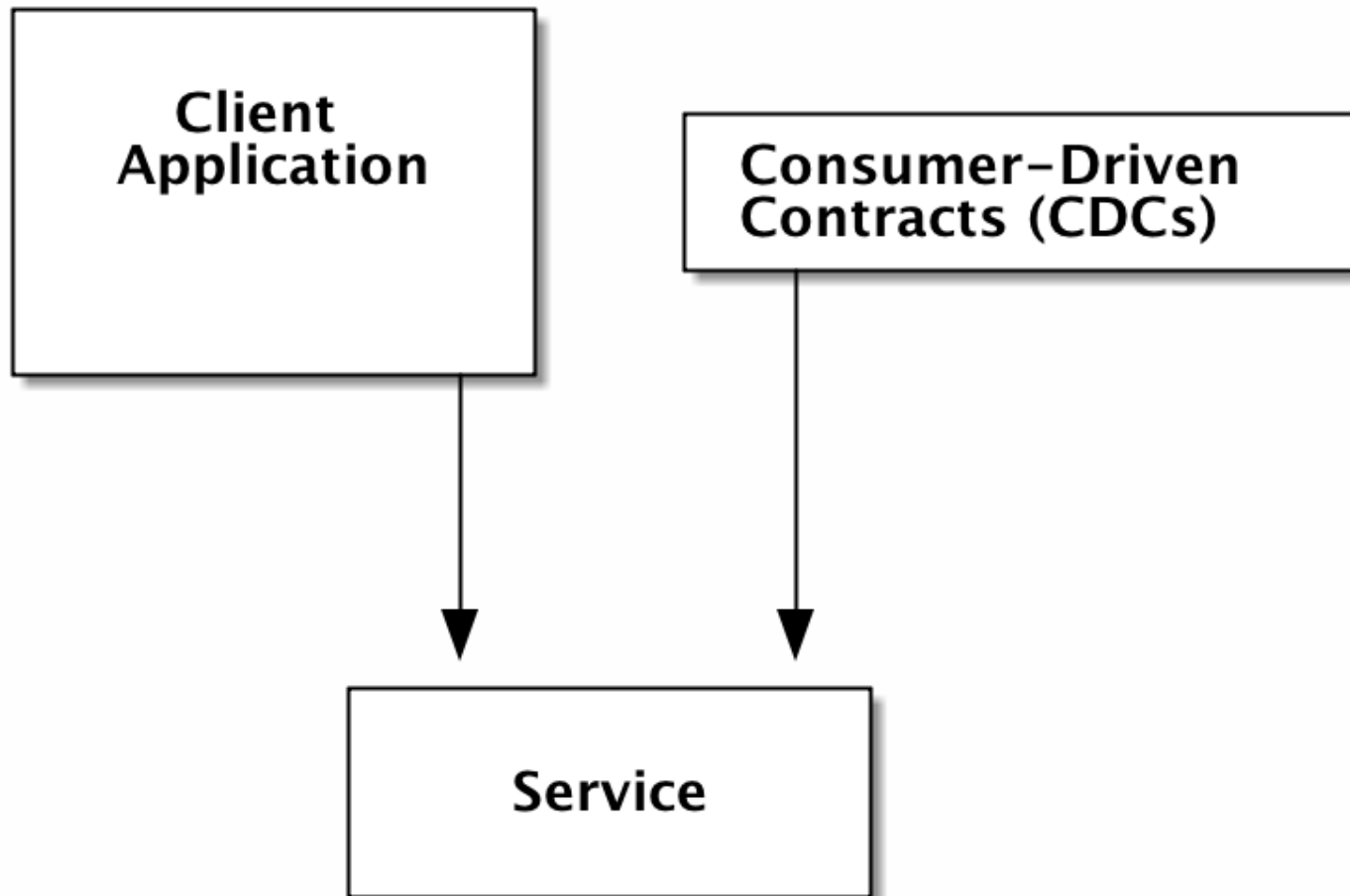
```
- {  
  - position: [ 52.510181 , 13.375399 ]  
    distance: 2403  
    title: The Ritz-Carlton Berlin  
    averageRating: 4.548387096774194  
  + category: { Hotel }  
    icon: http://download.vcdn.nokia.com/p/d/places2/icons/categories/01_02.icon  
    vicinity: Potsdamer Platz 3<br/>10785 Berlin<br/>Germany  
  - having: [ owner ]  
    type: urn:nlp-types:place  
    href: http://places.demo.api.here.com/places/v1/places/276u33d8-013841b7dc0a484799dcf9bd...  
    id: 276u33d8-013841b7dc0a484799dcf9bdac01573b  
  } ,  
- {  
    title: Eat & Drink  
    icon: http://download.vcdn.nokia.com/p/d/places2/icons/categories/03.icon  
    type: urn:nlp-types:search  
    href: http://places.demo.api.here.com/places/v1/discover/explore;context=ZmxvdylpZD04MTF...  
    places: http://places.demo.api.here.com/places/v1/discover/explore/places;context=ZmxvdylpZD04MTF...  
  } ,
```

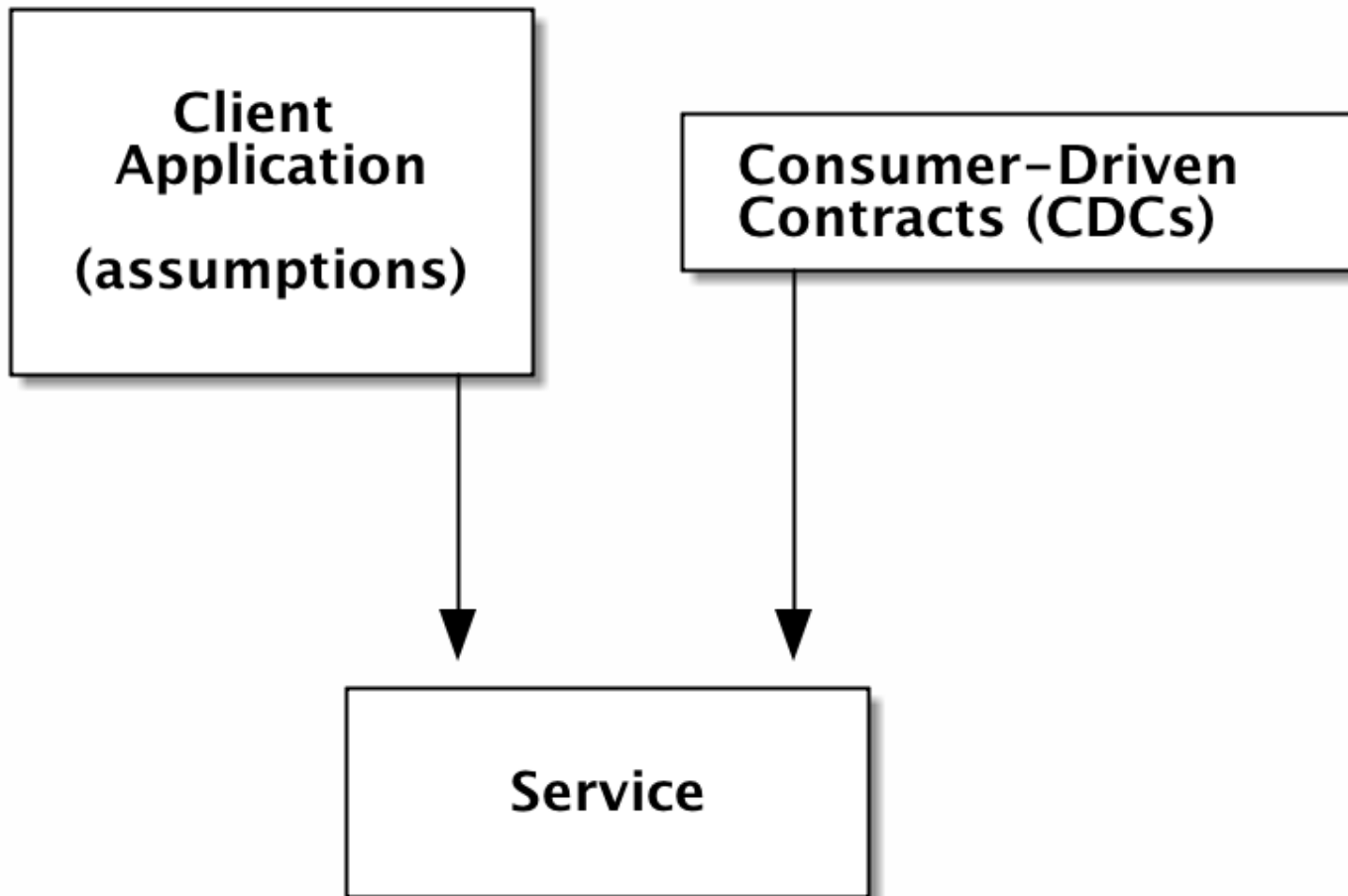
*“Be conservative in what you do,
be liberal in what you accept from others.”*

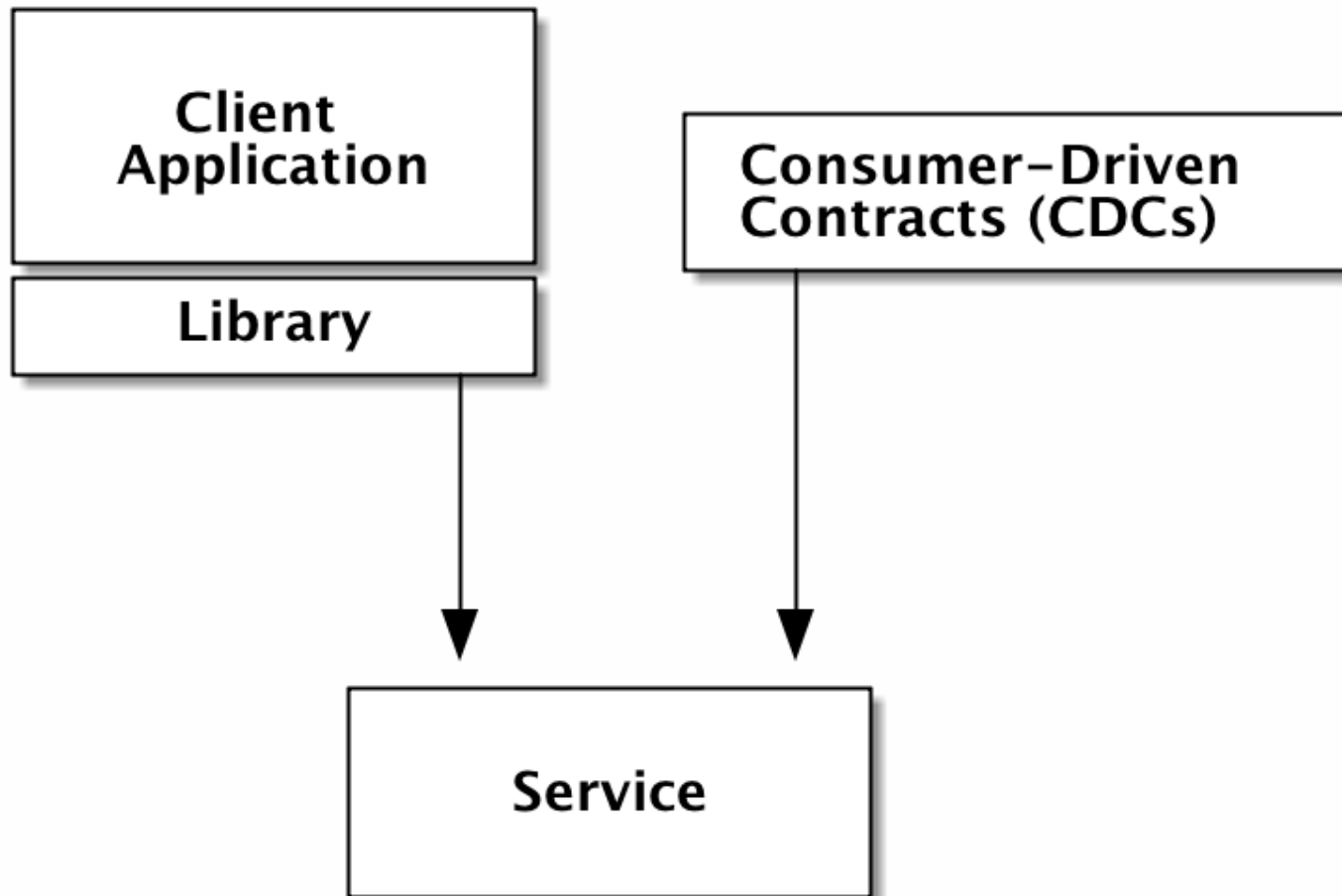
— RFC 793

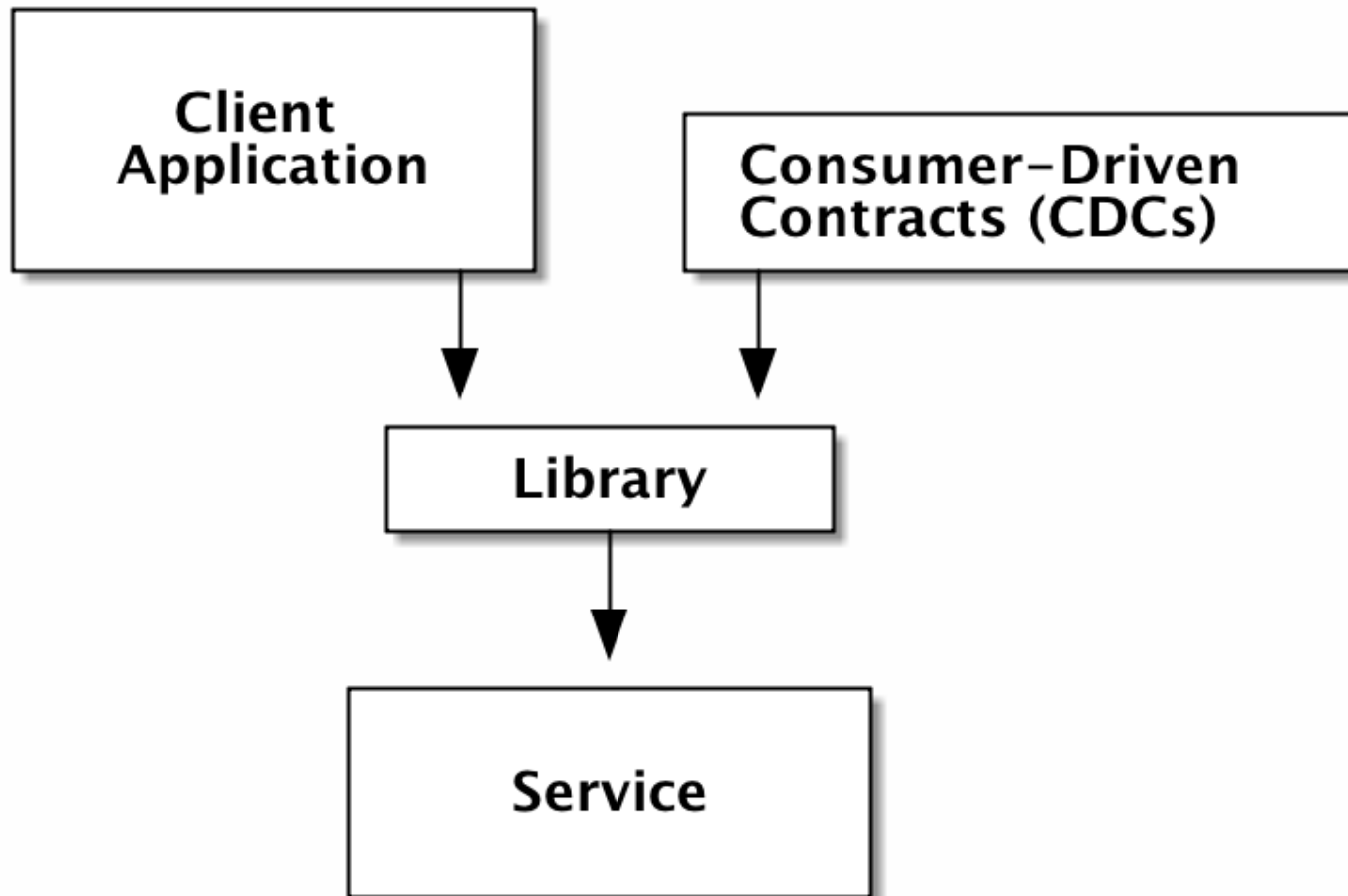
*“Be liberal in what you do,
be conservative in what you accept from others.”*
— *Felix Leipold*

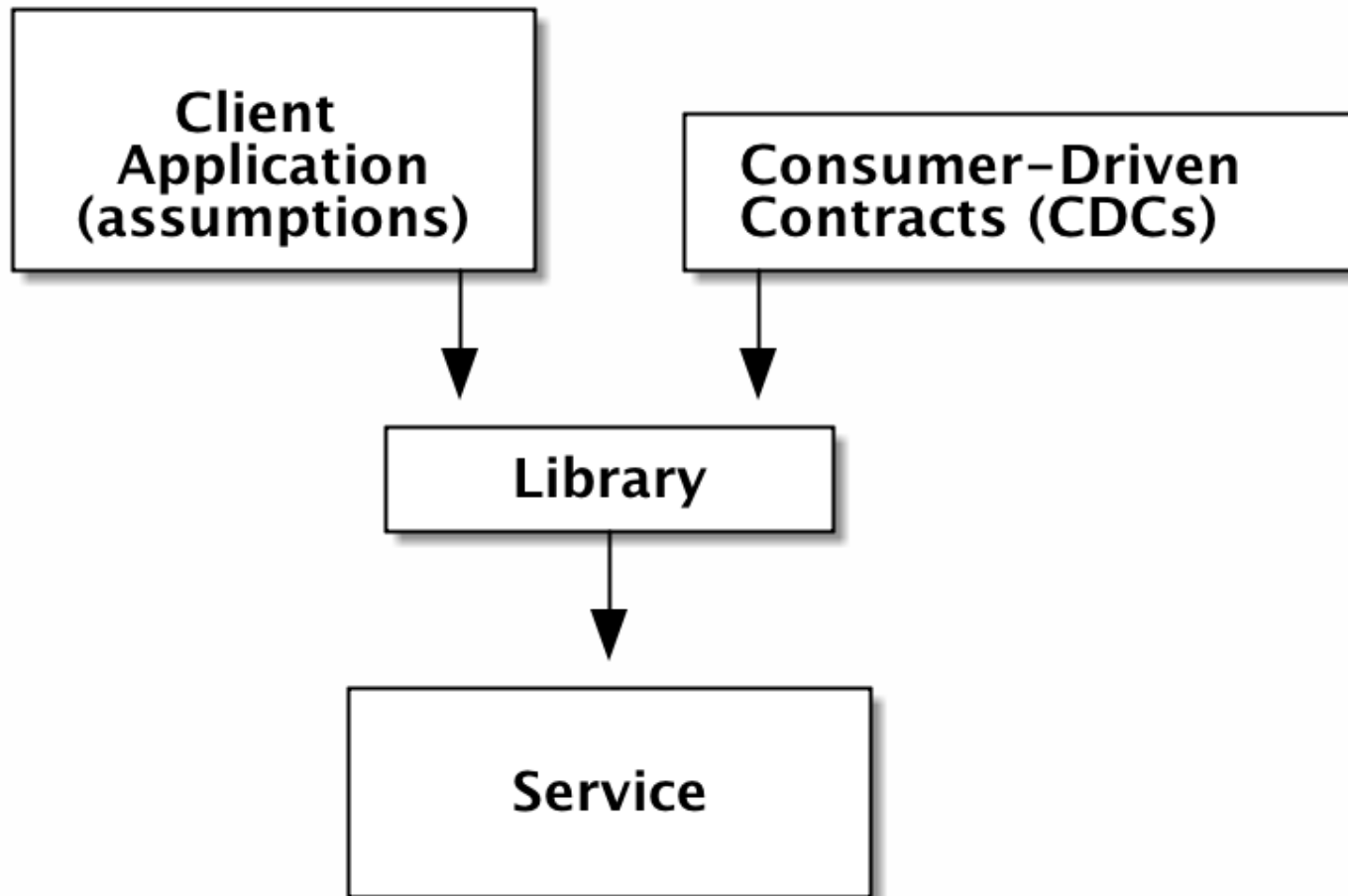
Backwards Compatibility

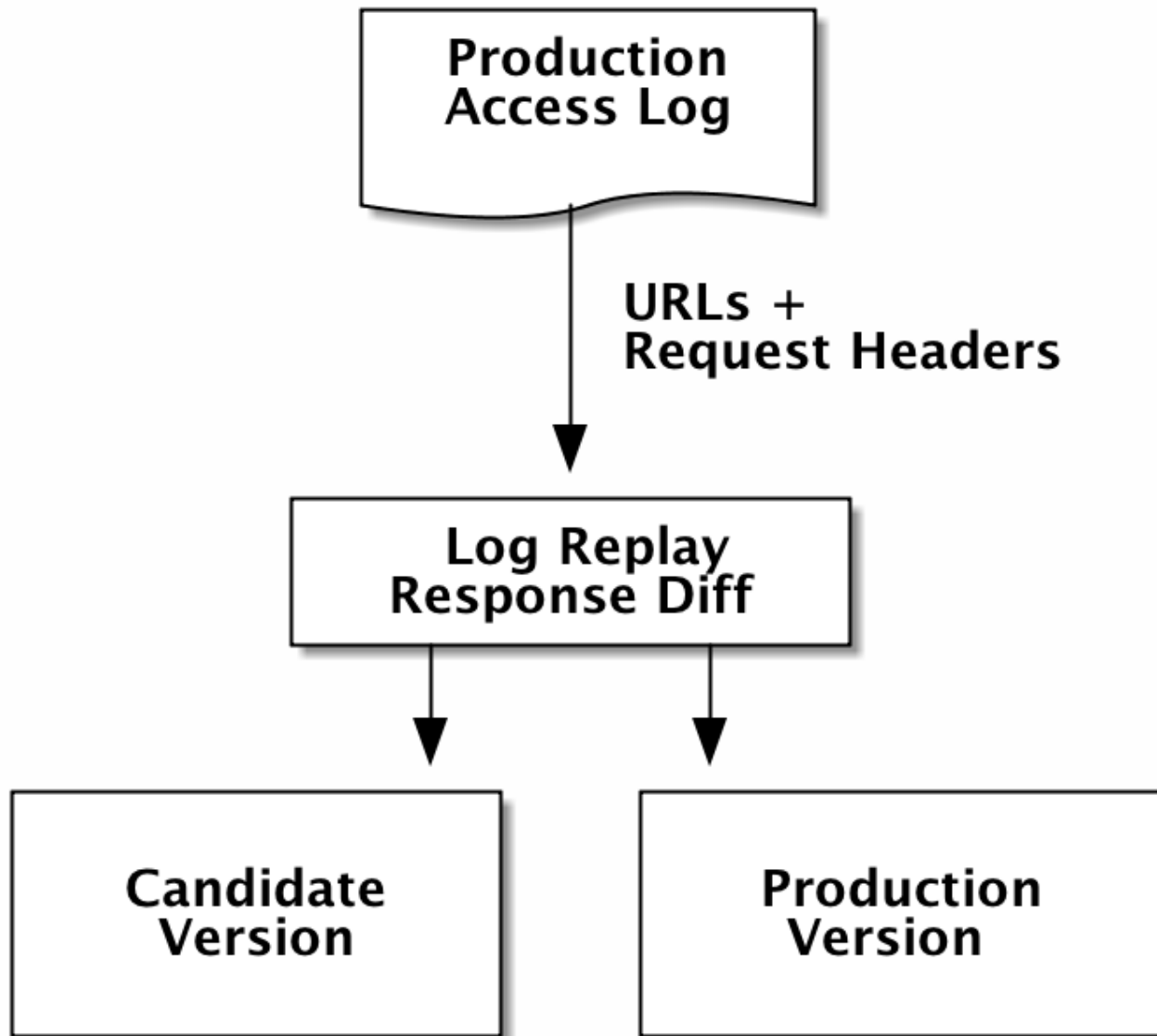












Expected vs. Actual Status Codes

Exp\Act	200	400	404
200	1349	0	0
400	0	2	0
404	0	0	249

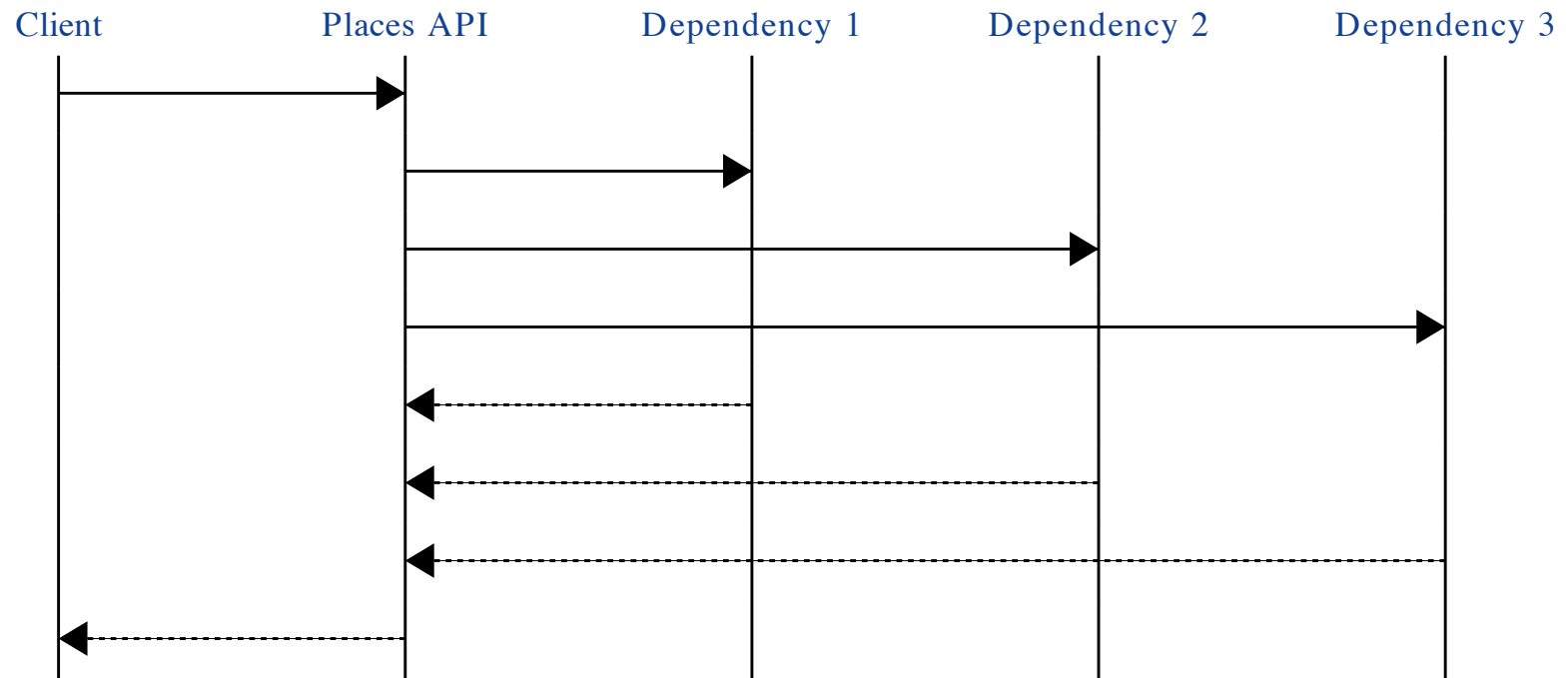
PASSED

Expected vs. Actual Status Codes

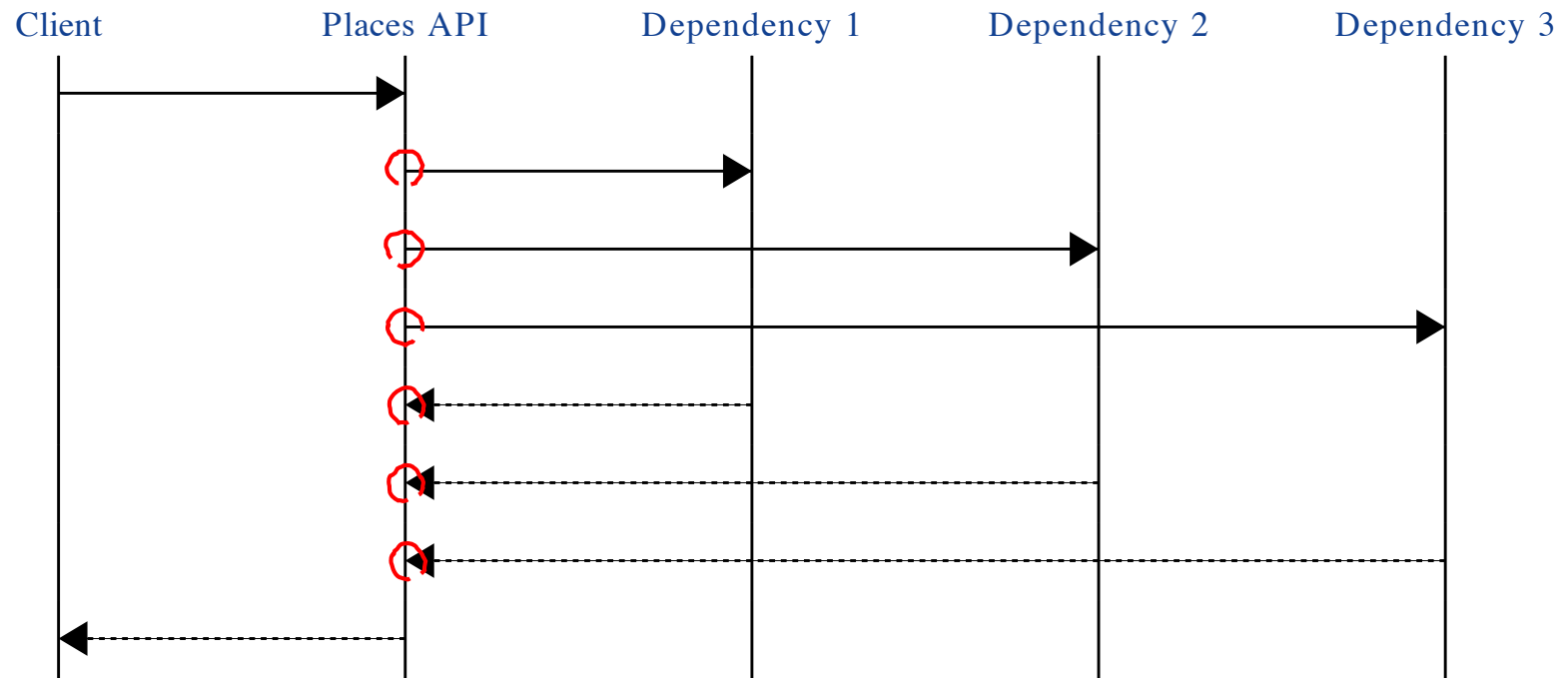
Exp\Act	200	400	404	503
200	1982	0	1	73
400	0	2	0	0
404	1	0	325	16
503	0	0	0	0

FAILED

Lifetime of a Request



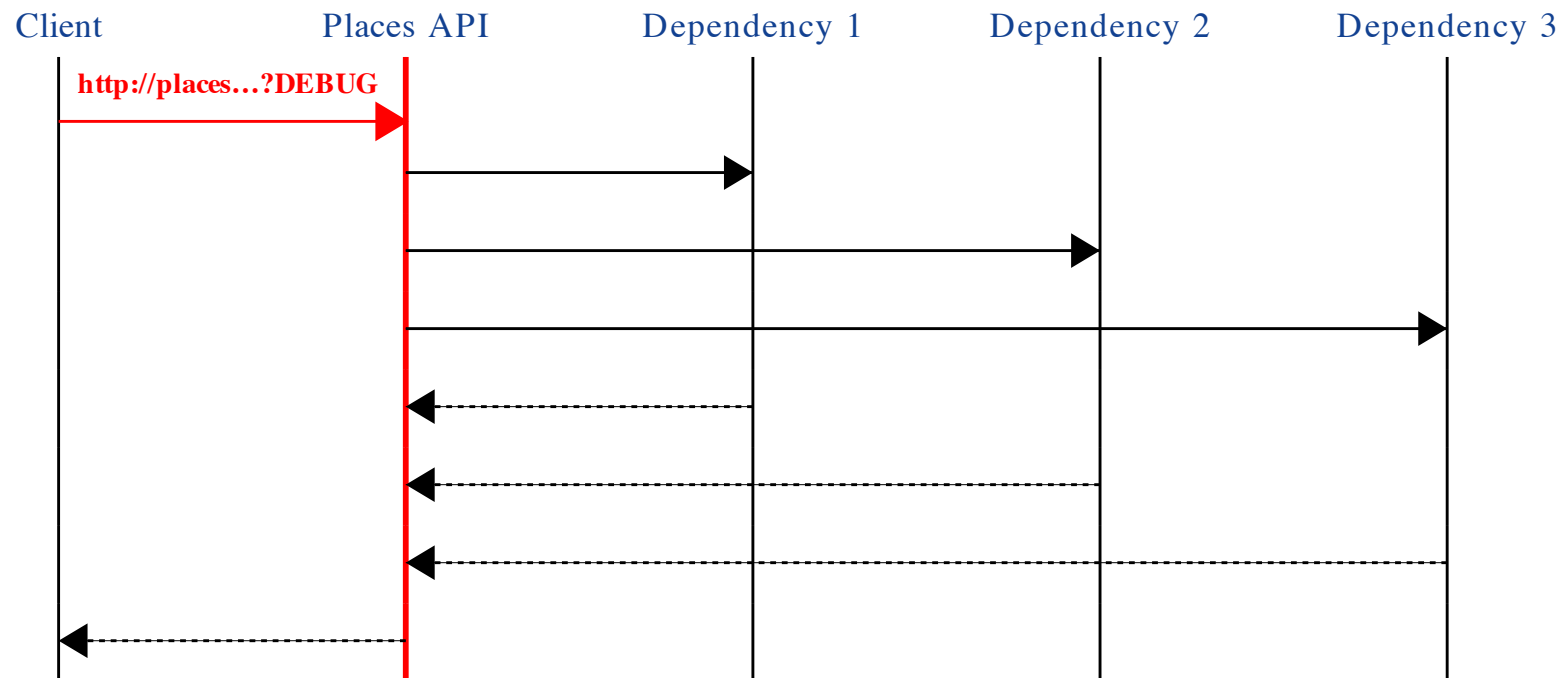
Cranking up the log level



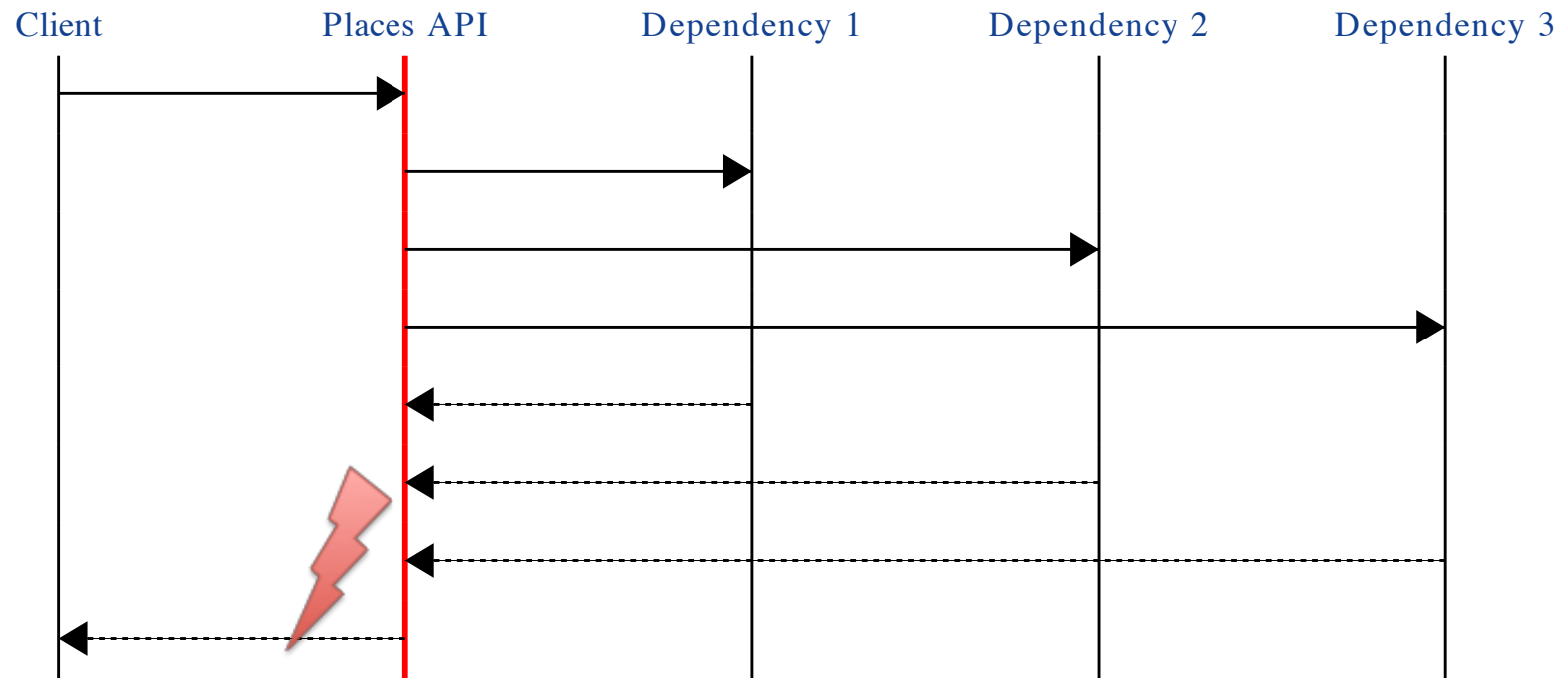
```

10.32.21.202 2013-10-17 00:01:01.611 +0000 GET /places/v1/categories/places/app_id=5THSL5GZfYhRvG1BduVUapp_code=TKm0pht6rLDBkNRZ07zg HTTP/1.1 200 2032 53 "com.trapster.android/4.2.1 HYBRIDPLUS/1.2.0.0 (Android/4.2.2; H
10.32.21.202 2013-10-17 00:01:01.685 +0000 GET /places/v1/discover/search/app_code=F0ZTSG3GYd nuVXtS1PRASApp_id=4C90pp0zw5C1ayZzdgGg-painterGat=35.6679qZC139.91576tf=plainSize=1000 HTTP/1.1 429 125 3 "Python-urllib/2.6
10.32.21.202 2013-10-17 00:01:01.926 +0000 GET /places/v1/discover/search/app_code=F0ZTSG3GYd nuVXtS1PRASApp_id=4C90pp0zw5C1ayZzdgGg-painterGat=35.6679qZC140.08576tf=plainSize=1000 HTTP/1.1 429 125 3 "Python-urllib/2.6
10.32.21.202 2013-10-17 00:01:02.113 +0000 GET /places/v1/discover/search/app_code=F0ZTSG3GYd nuVXtS1PRASApp_id=4C90pp0zw5C1ayZzdgGg-painterGat=35.6679qZC140.05576tf=plainSize=1000 HTTP/1.1 429 125 3 "Python-urllib/2.6
10.32.21.202 2013-10-17 00:01:02.471 +0000 GET /places/v1/discover/search/app_code=F0ZTSG3GYd nuVXtS1PRASApp_id=4C90pp0zw5C1ayZzdgGg-painterGat=35.6679qZC140.16576tf=plainSize=1000 HTTP/1.1 429 125 3 "Python-urllib/2.6
10.32.21.202 2013-10-17 00:01:02.747 +0000 GET /places/v1/discover/search/app_code=F0ZTSG3GYd nuVXtS1PRASApp_id=4C90pp0zw5C1ayZzdgGg-painterGat=35.6679qZC140.4576tf=plainSize=1000 HTTP/1.1 429 125 3 "Python-urllib/2.6
10.32.21.202 2013-10-17 00:01:03.015 +0000 GET /places/v1/discover/search/app_code=F0ZTSG3GYd nuVXtS1PRASApp_id=4C90pp0zw5C1ayZzdgGg-painterGat=35.6679qZC140.8988tf=plainSize=1000 HTTP/1.1 429 125 3 "Python-urllib/2.6
10.32.21.202 2013-10-17 00:01:03.123 +0000 GET /places/v1/discover/search/app_code=F0ZTSG3GYd nuVXtS1PRASApp_id=4C90pp0zw5C1ayZzdgGg-painterGat=35.6679qZC140.36576tf=plainSize=1000 HTTP/1.1 429 125 3 "Python-urllib/2.6
10.32.21.202 2013-10-17 00:01:03.385 +0000 GET /places/v1/discover/search/app_code=F0ZTSG3GYd nuVXtS1PRASApp_id=4C90pp0zw5C1ayZzdgGg-painterGat=35.6679qZC140.4576tf=plainSize=1000 HTTP/1.1 429 125 3 "Python-urllib/2.6
10.32.21.202 2013-10-17 00:01:03.512 +0000 GET /places/v1/discover/search/app_code=F0ZTSG3GYd nuVXtS1PRASApp_id=4C90pp0zw5C1ayZzdgGg-painterGat=35.6679qZC139.48576tf=plainSize=1000 HTTP/1.1 429 125 2 "Python-urllib/2.6
10.32.21.202 2013-10-17 00:01:03.549 +0000 GET /places/v1/categories/places/app_id=5THSL5GZfYhRvG1BduVUapp_code=TKm0pht6rLDBkNRZ07zg HTTP/1.1 200 2032 29 "com.trapster.android/4.2.1 HYBRIDPLUS/1.2.0.0 (Android/4.1.2; sa
10.32.21.202 2013-10-17 00:01:03.696 +0000 GET /places/v1/places/8409qqig-422afbff72d6445a10d61ff9772ab/related/recommended?tf=plainapp_id=NokiaMapsPBAP1app_code=phlR0496pKbsdCUXREA3D3ds0fset=88size=88bbox=-115.86669
10.32.21.202 2013-10-17 00:01:03.780 +0000 GET /places/v1/discover/search/app_code=F0ZTSG3GYd nuVXtS1PRASApp_id=4C90pp0zw5C1ayZzdgGg-painterGat=35.6679qZC139.54576tf=plainSize=1000 HTTP/1.1 429 125 2 "Python-urllib/2.6
10.32.21.202 2013-10-17 00:01:03.847 +0000 GET /places/v1/places/8409qqig-422afbff72d6445a10d61ff9772ab/related/recommended?tf=plainapp_id=NokiaMapsPBAP1app_code=phlR0496pKbsdCUXREA3D3ds0fset=88size=88bbox=-115.86669
10.32.21.202 2013-10-17 00:01:03.916 +0000 GET /places/v1/places/8409qqig-ed7bee224a4c88967597e0ae17f;context-zxmydyIzD08YmJzGv0Ym1lNDK0LTuM20YtQn1k1vZzZM4ZGUNTBTMT4MT4K20DA2ZUS18Xz1BNDGmFuz847app_id=NokiaMap
10.32.21.202 2013-10-17 00:01:03.941 +0000 GET /places/v1/places/8409qqig-ed7bee224a4c88967597e0ae17f;context-zxmydyIzD08YmJzGv0Ym1lNDK0LTuM20YtQn1k1vZzZM4ZGUNTBTMT4MT4K20DA2ZUS18Xz1BNDGmFuz847app_id=NokiaMap
10.32.21.202 2013-10-17 00:01:04.030 +0000 GET /places/v1/discover/search/app_code=F0ZTSG3GYd nuVXtS1PRASApp_id=4C90pp0zw5C1ayZzdgGg-painterGat=35.6679qZC139.63576tf=plainSize=1000 HTTP/1.1 429 125 3 "Python-urllib/2.6
10.0.0.1 [2013-10-17 00:01:04.073 -0000] GET /places/internal/health/node HTTP/1.1 200 159 3 "2776b5d5-f921-486a-8499-23b2c454dbd7f" "port=8080;accept=/*, application/json;accept-encoding=;accept-language=
10.32.21.202 2013-10-17 00:01:04.085 +0000 GET /places/v1/places/8409qqig-8a2ef3a8b16d4e22a3267c93356544e;context-zxmydyIzD08YmJzGv0Ym1lNDK0LTuM20YtQn1k1vZzZM4ZGUNTBTMT4MT4K20DA2ZUS18Xz1BNDGmFuz847app_id=NokiaMap
10.32.21.202 2013-10-17 00:01:04.129 +0000 GET /places/v1/categories/places/app_id=5THSL5GZfYhRvG1BduVUapp_code=TKm0pht6rLDBkNRZ07zg HTTP/1.1 200 2032 23 "com.trapster.android/4.2.1 HYBRIDPLUS/1.2.0.0 (Android/4.1.2; sa
10.32.21.202 2013-10-17 00:01:04.256 +0000 GET /places/v1/places/620888-924085b372b048f9a40d8f480e3ebbe/related/recommended?tf=plainapp_id=NokiaMapsPBAP1app_code=phlR0496pKbsdCUXREA3D3ds0fset=88size=88bbox=-115.86669
10.32.21.202 2013-10-17 00:01:04.421 +0000 GET /places/v1/discover/search/app_code=F0ZTSG3GYd nuVXtS1PRASApp_id=4C90pp0zw5C1ayZzdgGg-painterGat=35.6679qZC139.76576tf=plainSize=1000 HTTP/1.1 429 125 4 "Python-urllib/2.6
10.32.21.202 2013-10-17 00:01:04.673 +0000 GET /places/v1/discover/search/app_code=F0ZTSG3GYd nuVXtS1PRASApp_id=4C90pp0zw5C1ayZzdgGg-painterGat=35.6679qZC139.94576tf=plainSize=1000 HTTP/1.1 429 125 3 "Python-urllib/2.6
10.32.21.202 2013-10-17 00:01:04.966 +0000 GET /places/v1/discover/search/app_code=F0ZTSG3GYd nuVXtS1PRASApp_id=4C90pp0zw5C1ayZzdgGg-painterGat=35.6679qZC139.91576tf=plainSize=1000 HTTP/1.1 429 125 3 "Python-urllib/2.6
127.0.0.1 [2013-10-17 00:01:05.198 -0000] GET /places/internal/health/full HTTP/1.1 200 3634 1106 "22b67f11-66d0-4783-84d7-48c6d157b0ae" "port=8080;accept=/*, application/json;accept-encoding=;accept-language=
10.0.0.1 [2013-10-17 00:01:05.235 -0000] GET /places/internal/status HTTP/1.1 200 3630 28 991445e-9502-43ac-a527-3ab81775c61f" "port=8080;accept=/*, application/json;accept-encoding=;accept-language=
10.32.21.202 2013-10-17 00:01:05.236 +0000 GET /places/v1/discover/search/app_code=F0ZTSG3GYd nuVXtS1PRASApp_id=4C90pp0zw5C1ayZzdgGg-painterGat=35.6679qZC139.91576tf=plainSize=1000 HTTP/1.1 429 125 3 "Python-urllib/2.6
10.32.21.202 2013-10-17 00:01:05.626 +0000 GET /places/v1/discover/search/app_code=F0ZTSG3GYd nuVXtS1PRASApp_id=4C90pp0zw5C1ayZzdgGg-painterGat=35.6679qZC140.05576tf=plainSize=1000 HTTP/1.1 429 125 3 "Python-urllib/2.6
10.32.21.202 2013-10-17 00:01:06.006 +0000 GET /places/v1/discover/search/app_code=F0ZTSG3GYd nuVXtS1PRASApp_id=4C90pp0zw5C1ayZzdgGg-painterGat=35.6679qZC140.24576tf=
```

Looking at a Particular Request



Escalating Log Level

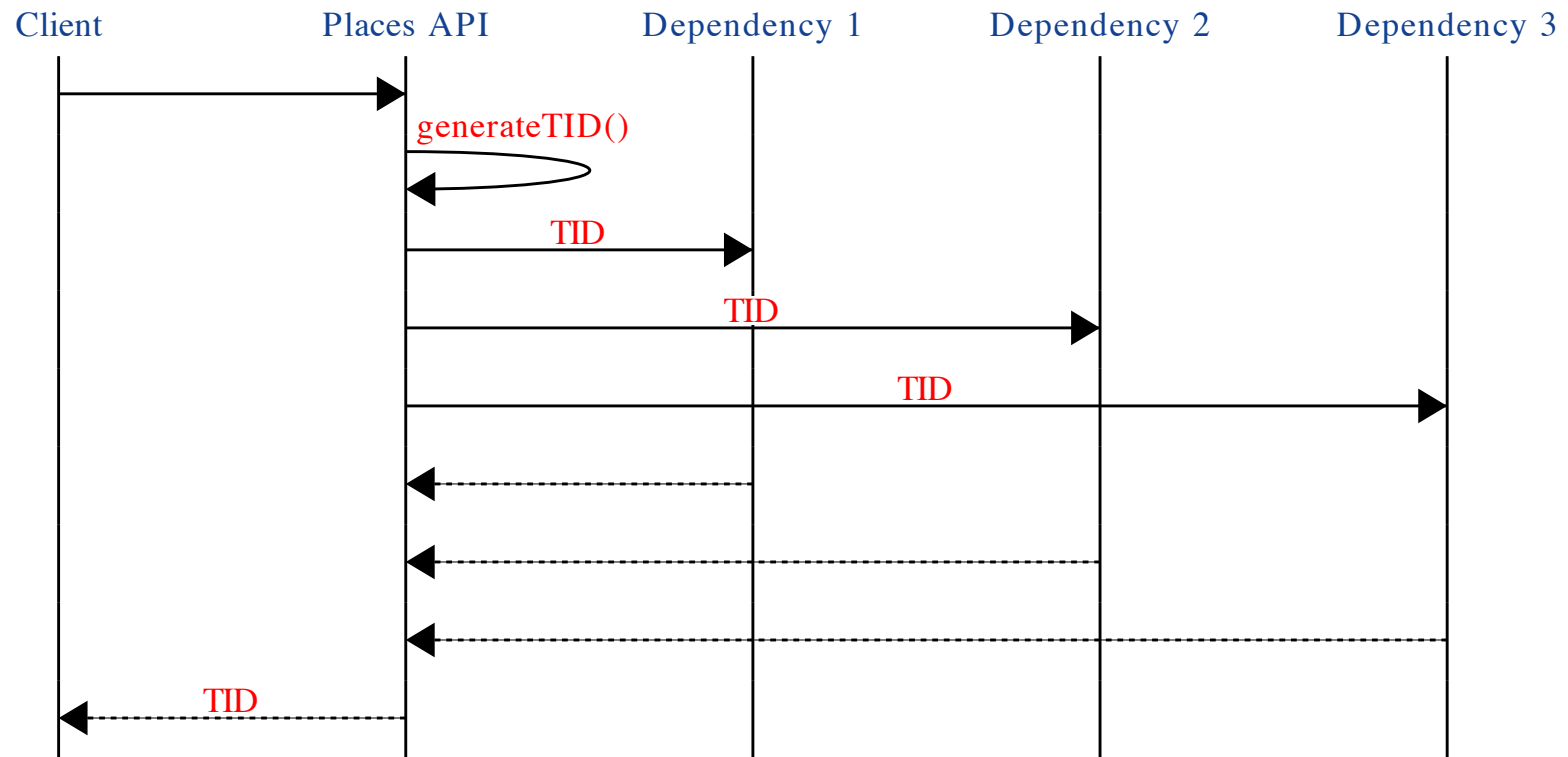


```
{
  name: Eiffel Tower
  placeId: 250u09tu-4561b8da952f4fd79c4e1998c3fcf032
  view: http://m.nokia.me/p?pid=250u09tu-4561b8da952f4fd79c4e1998c3fcf032
+ location: {...}
+ contacts: {...}
+ categories: [...]
  icon: http://download.vcdn.nokia.com/p/d/places2/icons/categories/38.icon
- debug: {
  - messages: [
    + { Decoded request context }
    + { sdc (place/250u09tu-4561b8da952f4fd79c4e1998c3fcf032 200) }
    + { AppId is not Nokia O&O therefore filtering tripadvisor content }
    + { scbe (scbe/v20/image 200) }
    + { ics (/poiDetails 200) }
    + { scbe (scbe/v20/averageRating 200) }
    + { scbe (scbe/v20/review 200) }
    + { scbe (scbe/v20/placeDescription 200) }
    + { request completed }
  ]
  - warnings: [ ]
  - incidents: [ ]
}
}
```



```
- debug: {
  - messages: [
    + { Decoded request context }
  - {
    timestamp: 2013-10-16 13:11:44
    service: sdc
    title: sdc (place/250u09tu-4561b8da952f4fd79c4e1998c3fcf032 200)
    endpoint: http://sdc.svc.ovl.com/place/250u09tu-4561b8da952f4fd79c4e1998c3fcf032
    path: place/250u09tu-4561b8da952f4fd79c4e1998c3fcf032
    method: GET
  - headers: {
    - X-User-Agent: [ Mozilla/5.0 (Macintosh; Intel Mac OS X 10.7; rv:24.0) Gecko/20100101 Firefox/24.0
      ]
    - X-FWD-APP-ID: [ demo_qCG24t50dH0wrLQ ]
    - X-FWD-Referer: [ http://places.demo.api.here.com/places/ ]
    - X-Forwarded-For: [ 192.100.123.82, 10.228.229.161 ]
    - X-NLP-Testing: [ 1 ]
    - X-NLP-TID: [ 6c7fc962-1070-4259-a90f-52ad70069e56 ]
  }
  - response: {
    status: 200
    time: 9
    - headers: {
      - Server: [ Apache ]
      - Expires: [ Wed, 16 Oct 2013 14:11:44 GMT ]
      - Connection: [ keep-alive ]
      - Cache-Control: [ max-age=3600 ]
      - Content-Type: [ application/xml;charset=UTF-8 ]
      - transfer-encoding: [ chunked ]
      - Date: [ Wed, 16 Oct 2013 13:11:43 GMT ]
    }
    body-size: 18930
  }
}
```


Returning Transaction IDs



Scala

Collections

// Given:

```
def reverseGeocode(ids: Seq[Address]): Seq[Coordinates] = ...
```

// We can write:

```
def fiveClosest(centre: Coordinates, places: Seq[Place]): Seq[Place] =  
  reverseGeocode(places.map(_.address))  
    .zip(places)  
    .sortBy { case (coords, place) => coords.distanceFrom(centre) }  
    .take(5)  
    .map(_._2)
```

Collections

// Given:

```
List<Coordinates> reverseGeocode(List<Address> ids) { ... }
```

// We can write:

```
List<Place> fiveClosest(Coordinates centre, List<Place> places) {  
    List<Address> ids = new ArrayList();  
    for(Place place : places)  
        ids.add(place.address());  
  
    List<Coordinates> coordinatesList = reverseGeocode(ids);  
  
    final Map<Place, Double> distanceByPlace = new HashMap();  
    for (int i = 0; i < places.size(); i++)  
        distanceByPlace.put(places.get(i), coordinatesList.get(i).distanceFrom(centre));  
  
    List<Place> sortedPlaces = new ArrayList(places);  
    Collections.sort(sortedPlaces, new Comparator<Place>() {  
        public int compare(Place a, Place b) {  
            return Double.compare(distanceByPlace.get(a), distanceByPlace.get(b));  
        }  
    });  
  
    return sortedPlaces.subList(0, 5);  
}
```

Options

// Given:

```
def fetchUserContent(id: PlaceID): Option[UserContent] = ...
```

// We can write:

```
def augmentWithUserImages(place: Place): Place = {  
  val userContent = fetchUserContent(place.id)  
  
  val userImages: Seq[Image] =  
    userContent  
      .map(_.images)  
      .getOrElse(Seq.empty)  
  
  place.copy(images = place.images ++ userImages)  
}
```


Options

// Given:

```
UserContent fetchUserContent(PlaceID id) { ... }
```

// We can write:

```
Place augmentWithUserImages(Place place) {  
    UserContent userContent = fetchUserContent(place.getID());  
  
    if (userContent != null) {  
        List<Image> images = place.getImages();  
        images.addAll(userContent.getImages());  
        place.setImages(place.getImages());  
    }  
  
    return place;  
}
```

Case Classes

```
case class Coordinates(latitude: Double,  
                        longitude: Double)
```

```
case class Location(position: Coordinates,  
                    address: Option[Address] = None)
```

```
val gotoConferenceLocation = Coordinates(52.473068, 13.45878))
```

```
val gotoLocationWithAddress =  
  gotoConferenceLocation.copy(  
    address = Address(street = Some("Sonnenallee"),  
                      house = Some("225"),  
                      city = Some("Berlin"))
```

Futures

Eventual result of an asynchronous operation

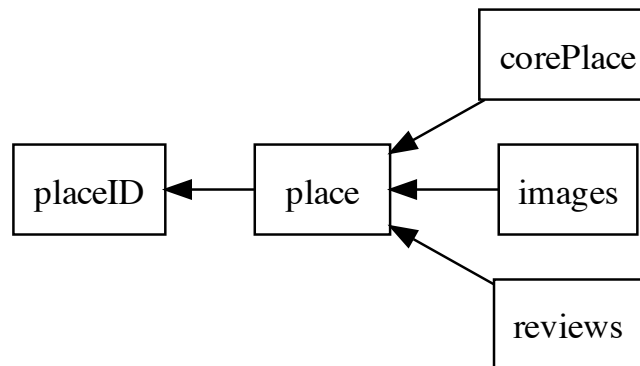
```
val responseFuture: Future[Response] =  
  Future { client.makeSyncCall(request) }
```

// Given:

```
def renderResponse(place: Place): Response = ...  
def buildPlace(metadata: Metadata,  
               images: Seq[Image],  
               reviews: Seq[Review]): Place = ...
```

// We can write:

```
val futureMetadata: Future[Metadata] = ...  
val futureImages: Future[Seq[Image]] = ...  
val futureReviews: Future[Seq[Review]] = ...  
  
val place: Future[Place] = for {  
  metadata <- futureMetadata  
  images <- futureImages  
  reviews <- futureReviews  
} yield buildPlace(metadata, images, reviews)  
  
val response: Future[Response] = place.map(renderResponse)
```



Lessons Learnt

API development is different from app development

Make it easy to play around and explore

Make it easy to troubleshoot problems

Be strict with what you accept

Use production activity to drive meaningful tests

Treat documentation as a first-class concern

Use it

```
curl -s \  
  --data-urlencode "cat=eat-drink" \  
  --data-urlencode "in=52.5304,13.3864;r=640" \  
  --data-urlencode "size=15" \  
  --data-urlencode "pretty" \  
  --data-urlencode "app_code=NYKC67ShPhQwqaydGIW4yg" \  
  --data-urlencode "app_id=demo_qCG24t50dHOwrLQ" \  
  --get 'http://places.demo.api.here.com/places/v1/discover/explore' \  
  | jsed --raw 'function(r)  
    r.results.items.map(function(i)  
      i.title + " (distance " + i.distance.toString() + "m)"  
    ).join("\n")' \  
  | rl -c 1
```

Questions?

<https://places.demo.api.here.com>

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