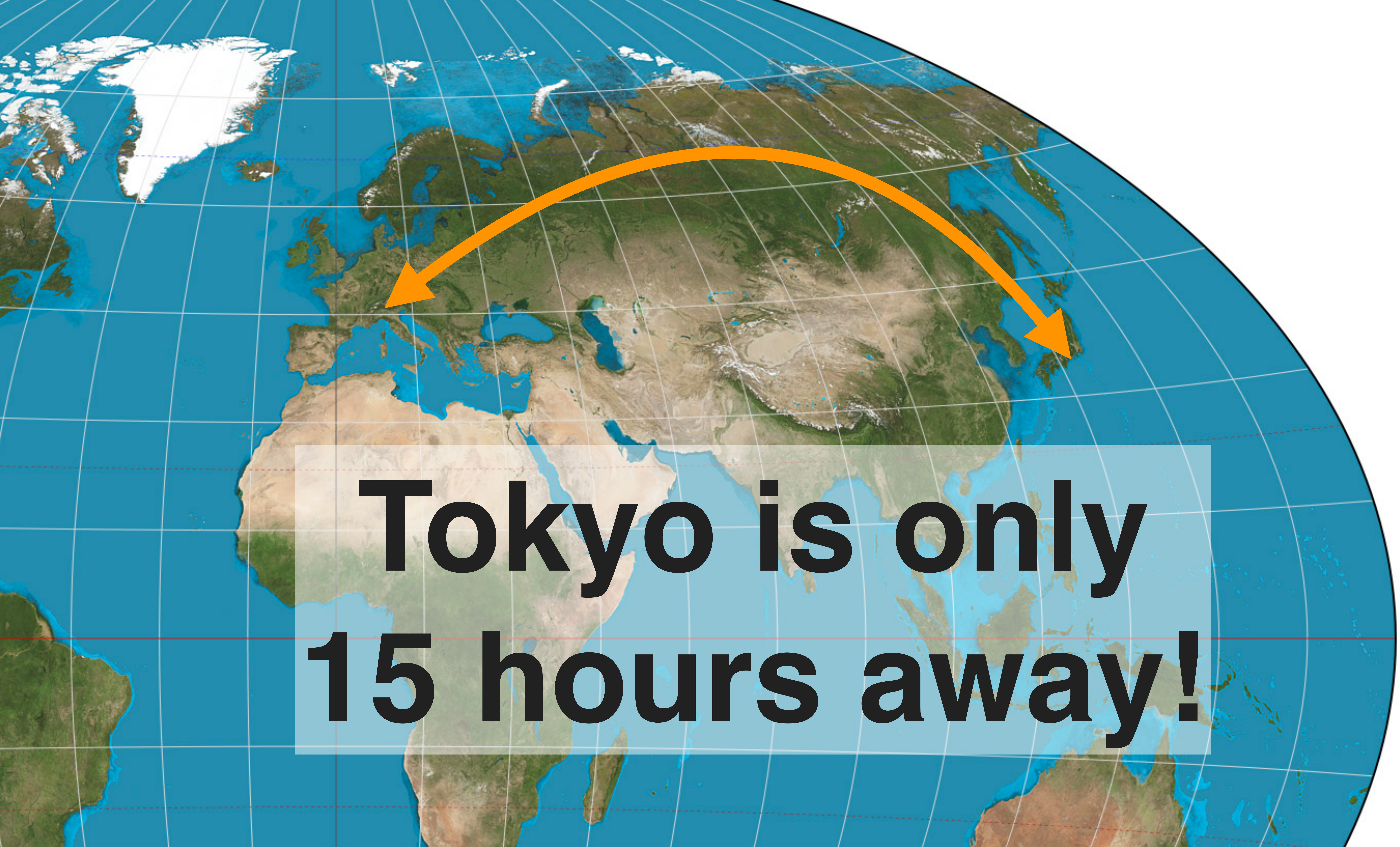
Improving UX through performance

Droidcon Italy 2015

@rejasupotaro
Kentaro Takiguchi



Tokyo is only 15 hours away!

Ruby is developed by Matz in Japan

Cookpad is a
recipe sharing service
written in RoR

2 million recipes

50 million UU / month

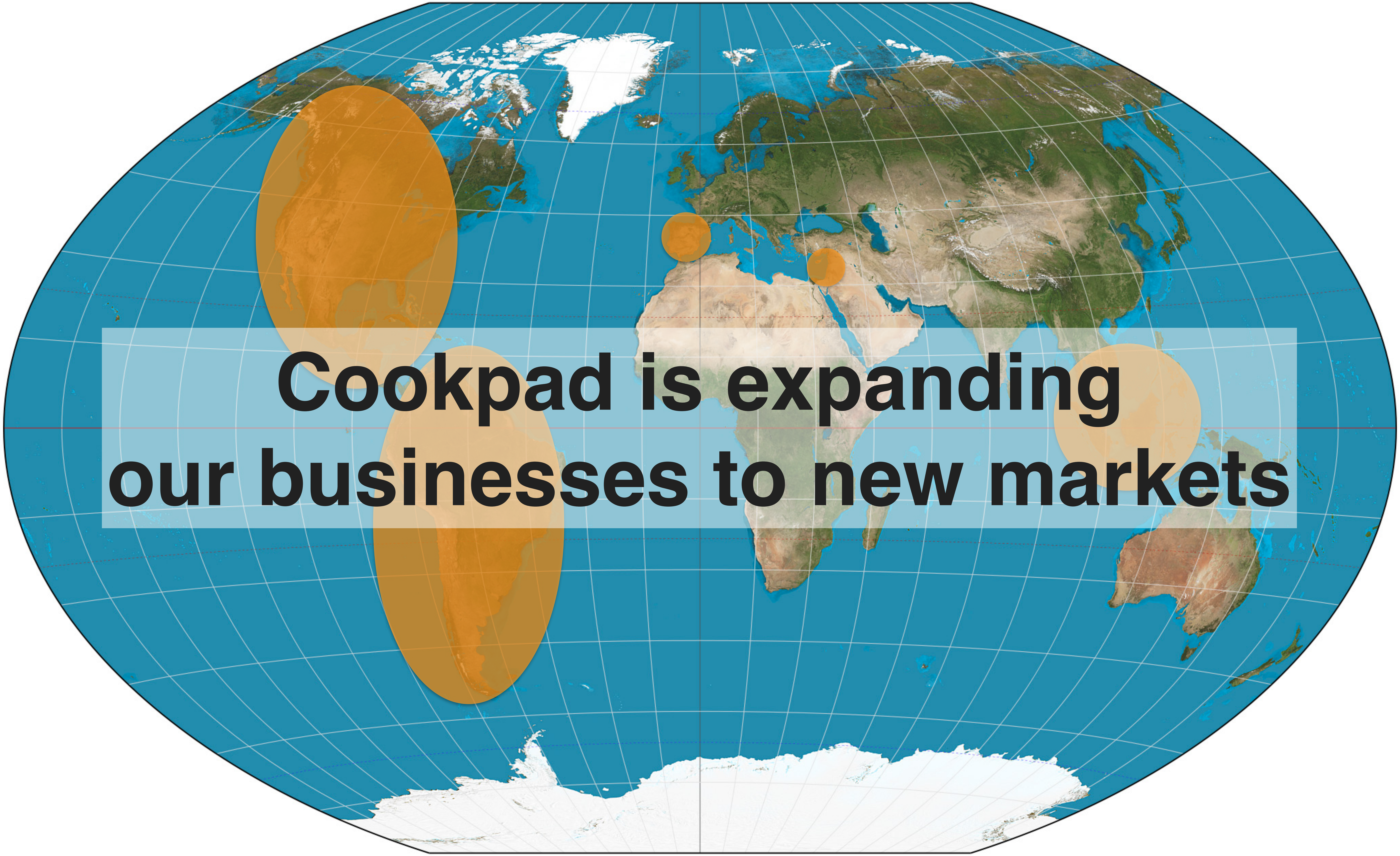
20 million downloads

Published on Mar 5, 2015

The Recipe for the World's Largest Rails Monolith

Akira Matsuda

https://speakerdeck.com/a_matsuda/the-recipe-for-the-worlds-largest-rails-monolith



Cookpad is expanding our businesses to new markets

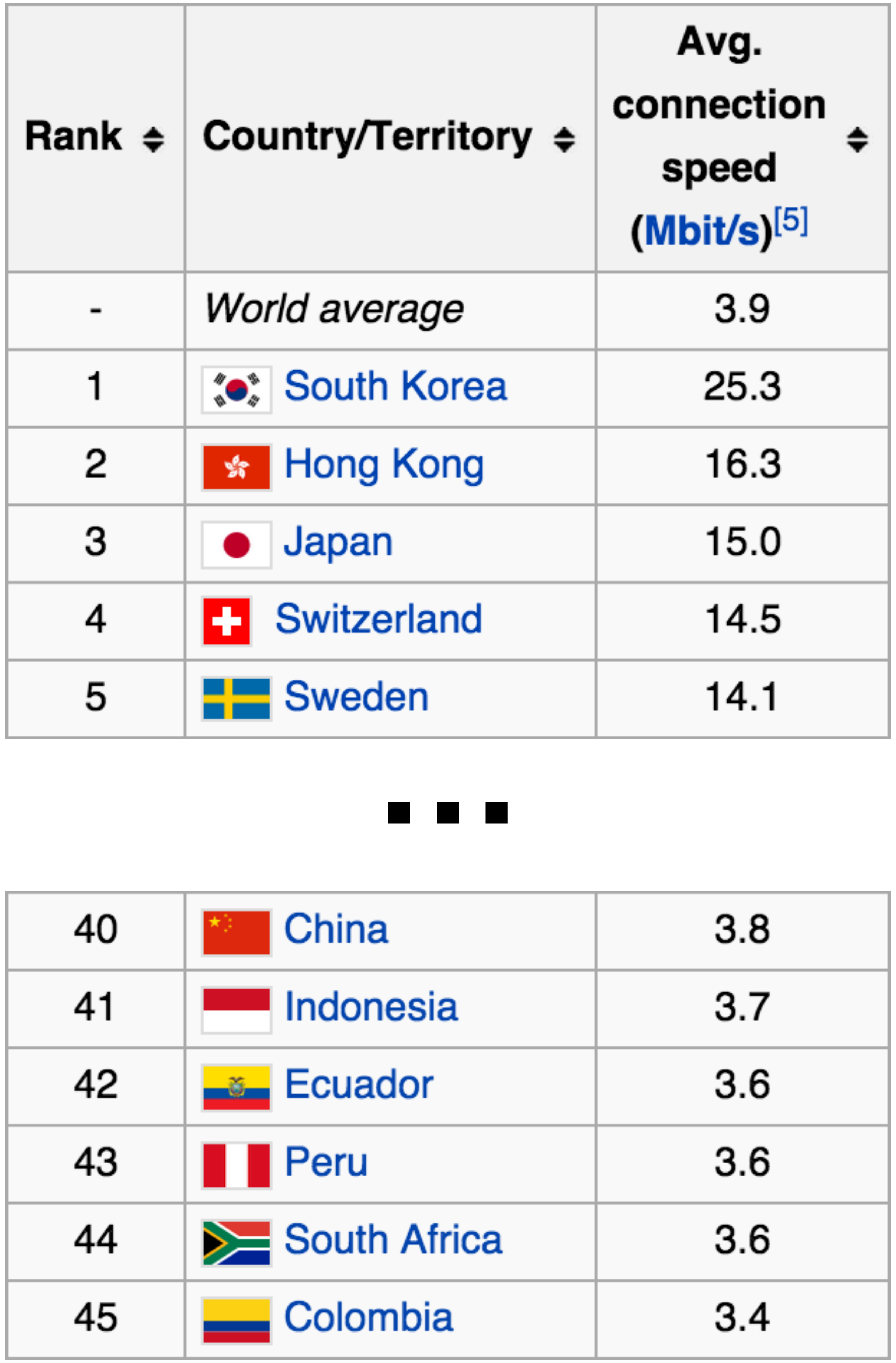
Emerging market is leading smartphone growth

I was in Indonesia for a month
to experience actual life in Indonesia

Not everyone is on a fast phone
Not everyone is on a fast network

The greatest challenges

- Low bandwidth
- Low spec devices



Rank	Country/Territory	Avg. connection speed (Mbit/s)[5]
-	*World average*	3.9
1	South Korea	25.3
2	Hong Kong	16.3
3	Japan	15.0
4	Switzerland	14.5
5	Sweden	14.1
	...	
40	China	3.8
41	Indonesia	3.7
42	Ecuador	3.6
43	Peru	3.6
44	South Africa	3.6
45	Colombia	3.4

Connection speed in Indonesia is 5x slower than in Japan

http://en.wikipedia.org/wiki/List_of_countries_by_Internet_connection_speeds

Performance is a Feature

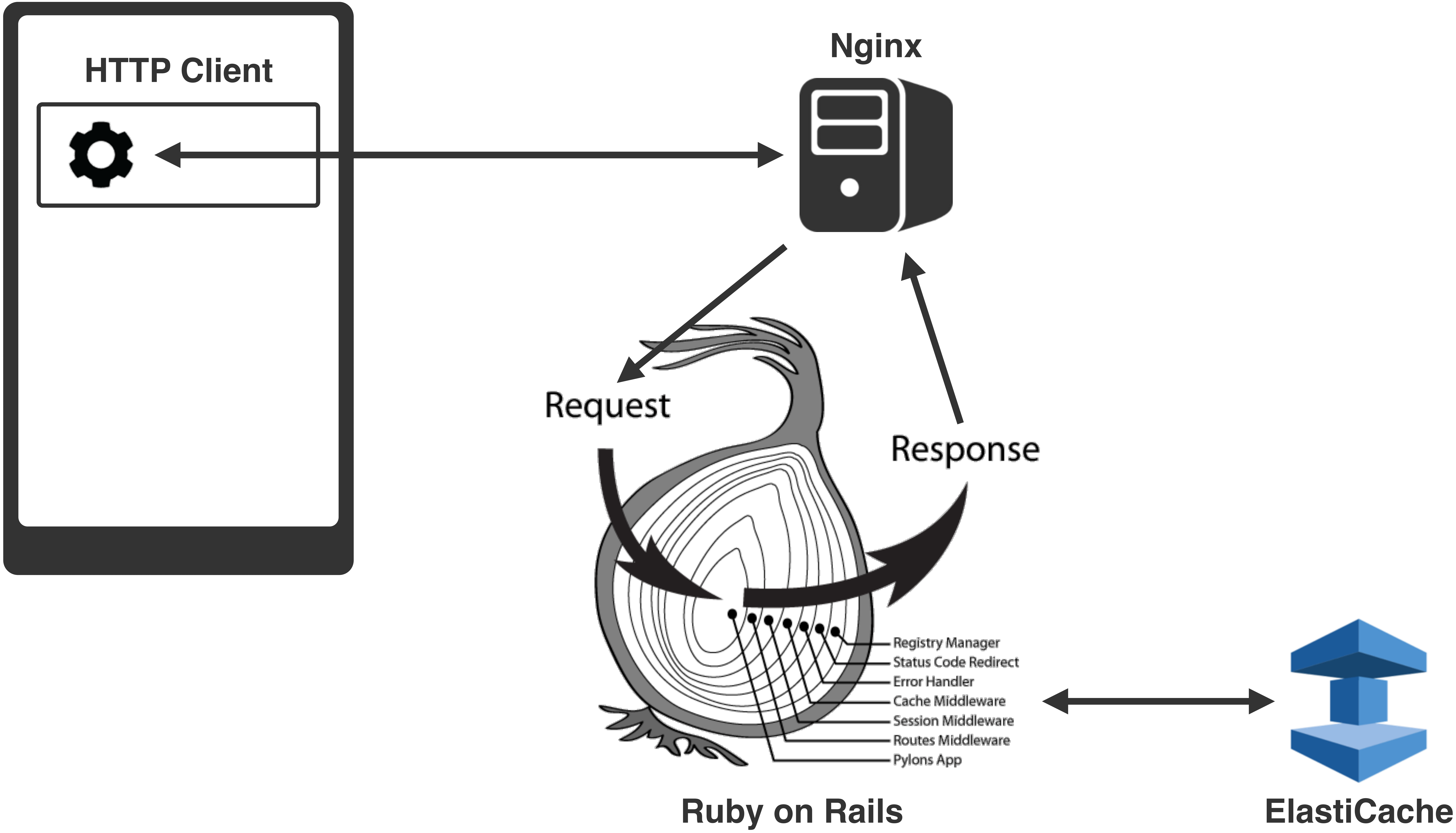
It is becoming increasingly important
for mobile engineers
to guarantee stable service
under any environment

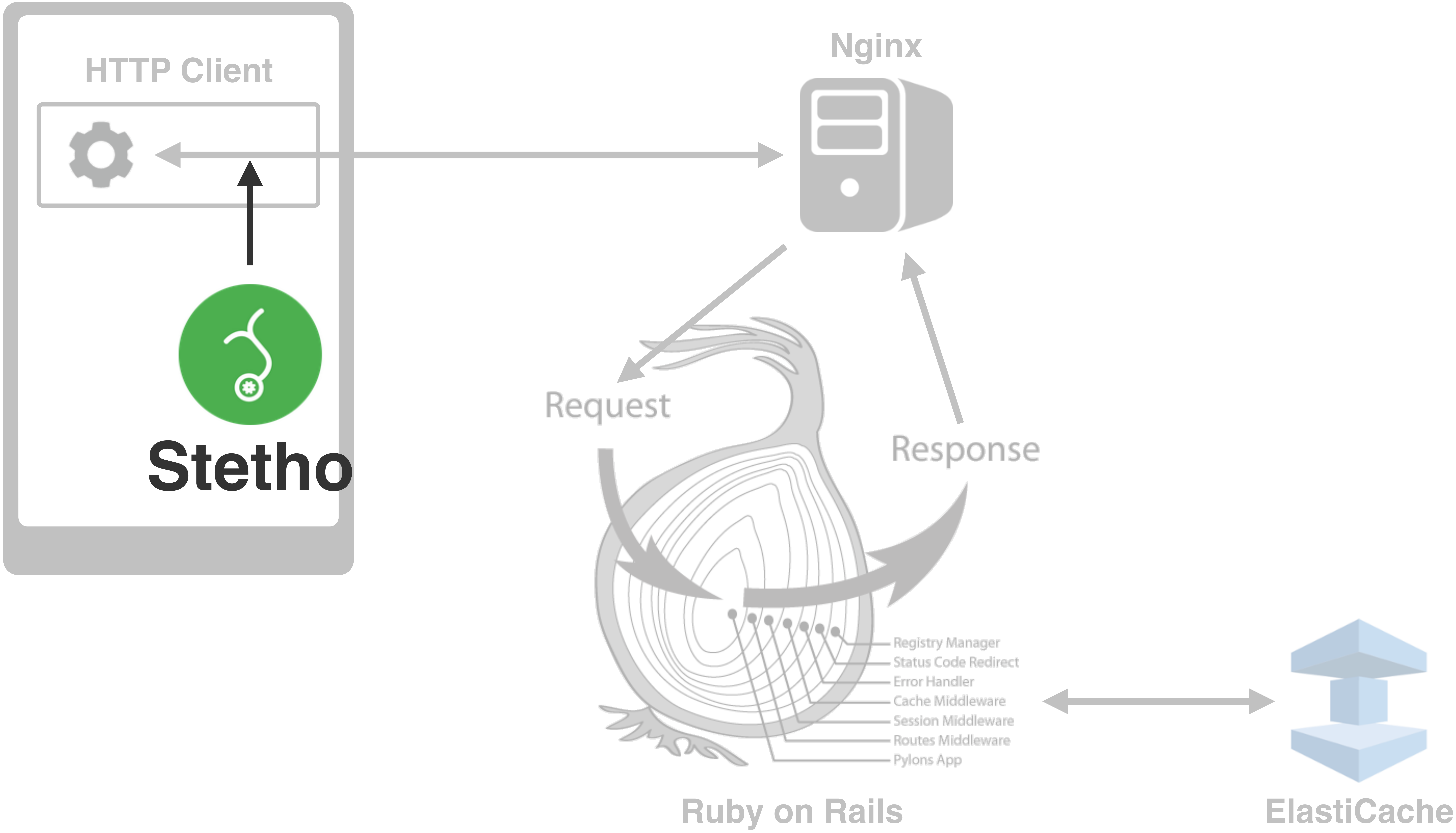
I’m rebuilding the Android app for new markets

Agenda

- Efficient HTTP communication
- Image optimization
- API design

Efficient HTTP communication


HTTP Client
Nginx
Request
Response
Registry Manager
Status Code Redirect
Error Handler
Cache Middleware
Session Middleware
Routes Middleware
Pylons App
Ruby on Rails
ElastiCache



HTTP Client

Stetho

Nginx

Request

Response

Ruby on Rails

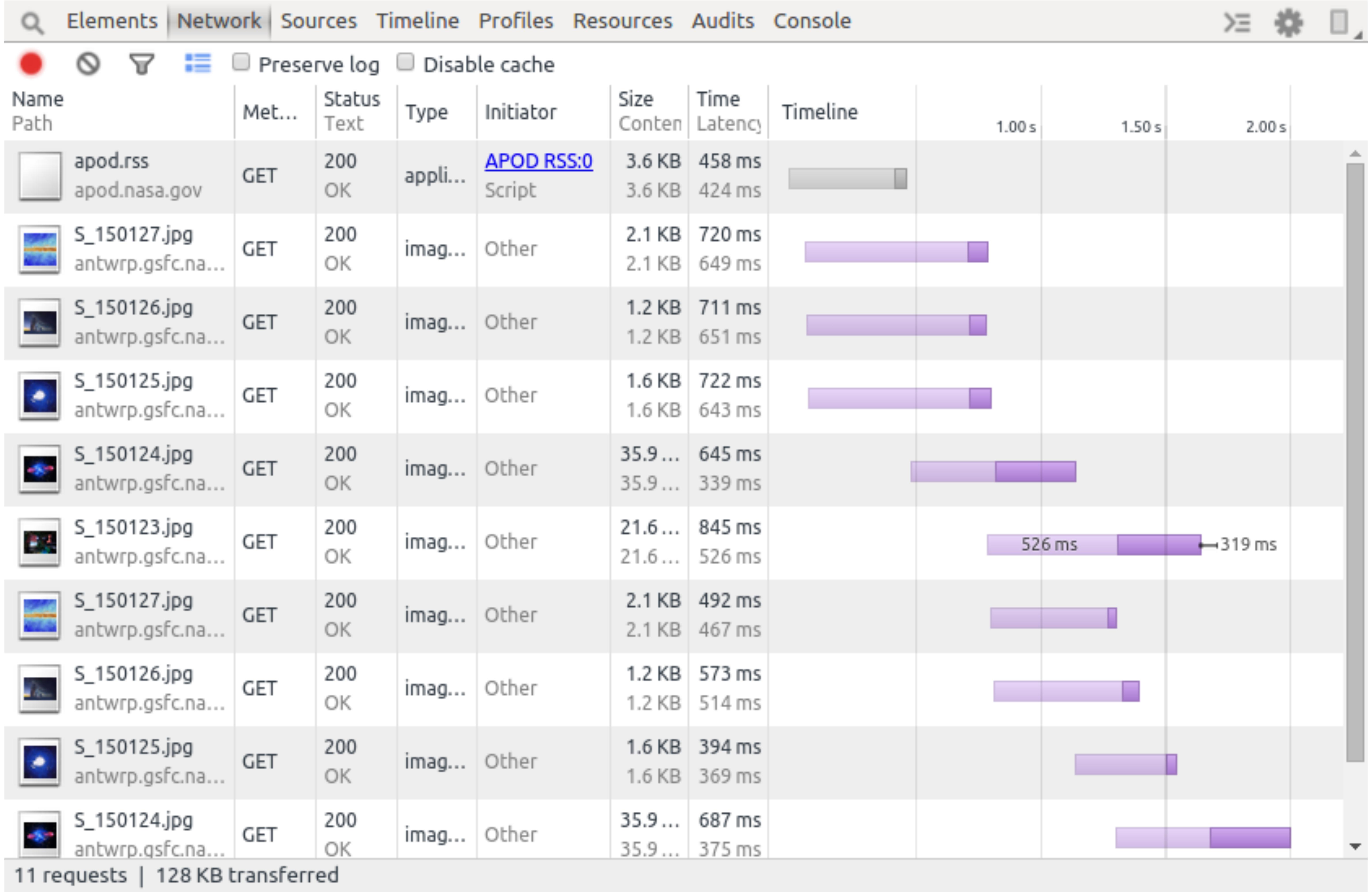
ElastiCache

Stetho

A debug bridge for Android applications

https://github.com/facebook/stetho

We can see network

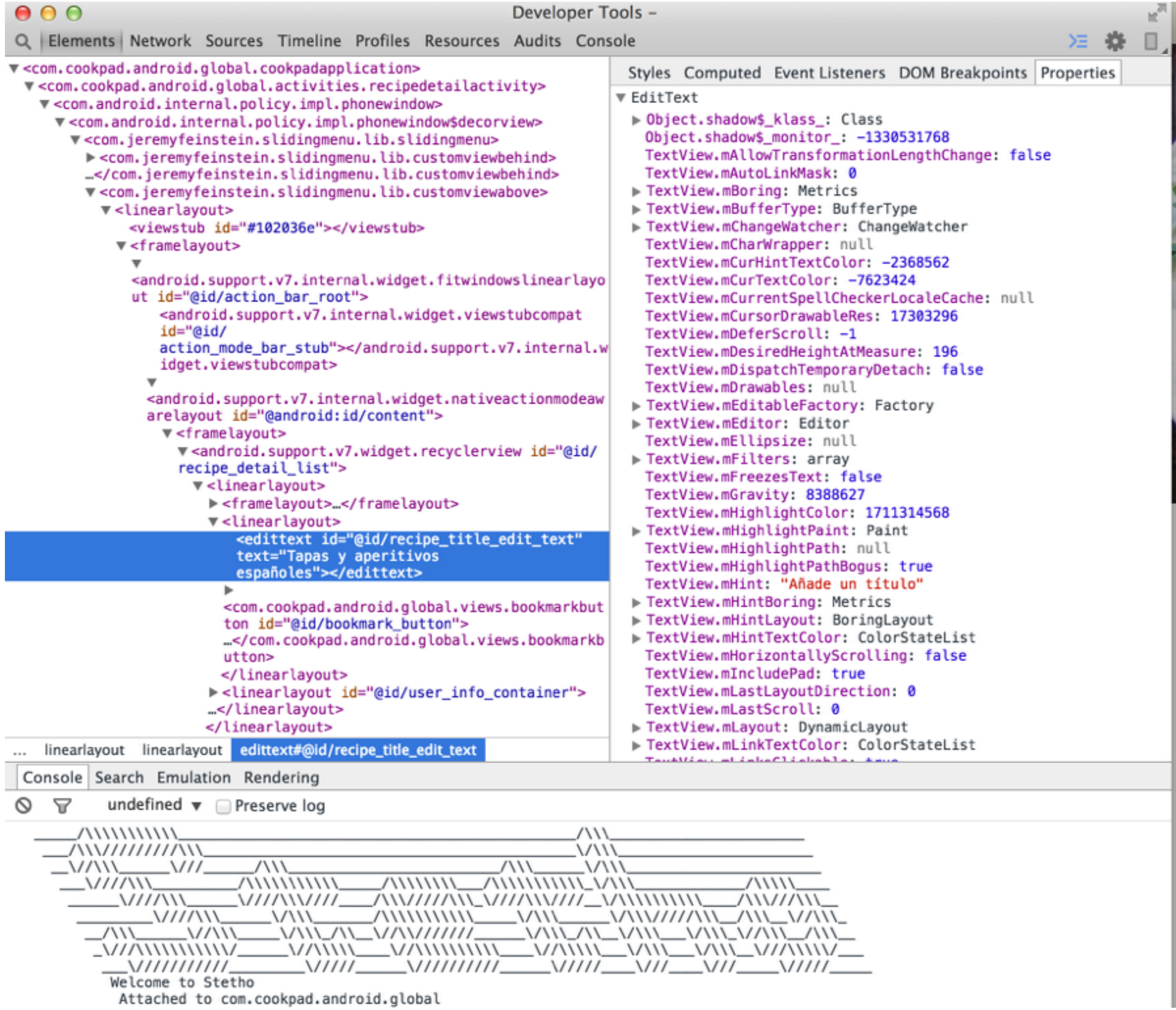


□ Preserve log □ Disable cache

Name Path	Met…	Status Text	Type	Initiator	Size Conten	Time Latency	Timeline 1.00 s 1.50 s 2.00 s
apod.rss apod.nasa.gov	GET	200 OK	appli…	APOD RSS:0 Script	3.6 KB 3.6 KB	458 ms 424 ms	
S_150127.jpg antwrp.gsfc.na…	GET	200 OK	imag…	Other	2.1 KB 2.1 KB	720 ms 649 ms	
S_150126.jpg antwrp.gsfc.na…	GET	200 OK	imag…	Other	1.2 KB 1.2 KB	711 ms 651 ms	
S_150125.jpg antwrp.gsfc.na…	GET	200 OK	imag…	Other	1.6 KB 1.6 KB	722 ms 643 ms	
S_150124.jpg antwrp.gsfc.na…	GET	200 OK	imag…	Other	35.9 … 35.9 …	645 ms 339 ms	
S_150123.jpg antwrp.gsfc.na…	GET	200 OK	imag…	Other	21.6 … 21.6 …	845 ms 526 ms	526 ms 319 ms
S_150127.jpg antwrp.gsfc.na…	GET	200 OK	imag…	Other	2.1 KB 2.1 KB	492 ms 467 ms	
S_150126.jpg antwrp.gsfc.na…	GET	200 OK	imag…	Other	1.2 KB 1.2 KB	573 ms 514 ms	
S_150125.jpg antwrp.gsfc.na…	GET	200 OK	imag…	Other	1.6 KB 1.6 KB	394 ms 369 ms	
S_150124.jpg antwrp.gsfc.na…	GET	200 OK	imag…	Other	35.9 … 35.9 …	687 ms 375 ms	

11 requests | 128 KB transferred

We can see view hierarchy

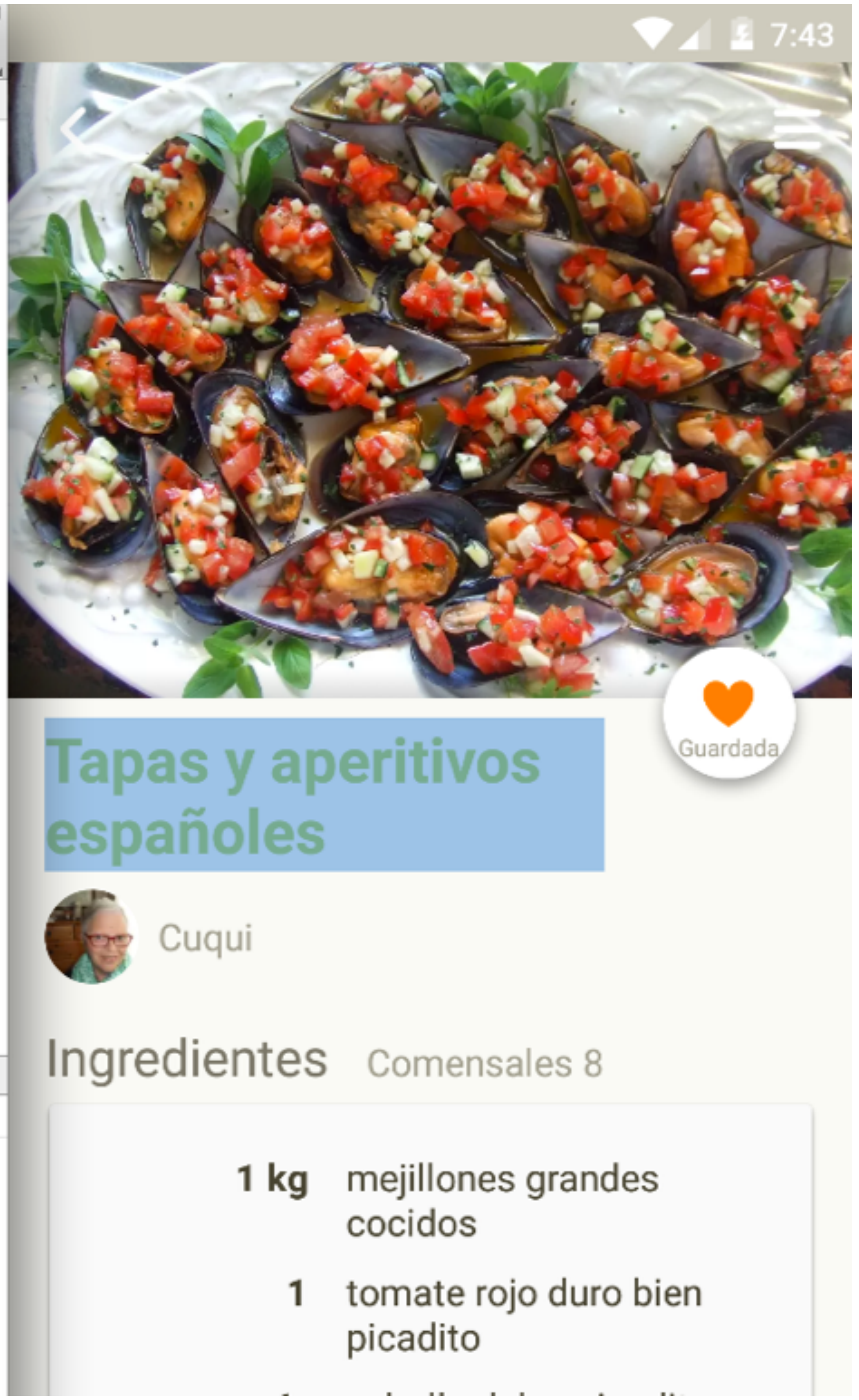


```
▼<com.cookpad.android.global.cookpadapplication>
  ▼<com.cookpad.android.global.activities.recipedetailactivity>
    ▼<com.android.internal.policy.impl.phonewindow>
      ▼<com.android.internal.policy.impl.phonewindow$decorview>
        ▼<com.jeremyfeinstein.slidingmenu.lib.slidingmenu>
          ▶<com.jeremyfeinstein.slidingmenu.lib.customviewbehind>
          …</com.jeremyfeinstein.slidingmenu.lib.customviewbehind>
          ▼<com.jeremyfeinstein.slidingmenu.lib.customviewabove>
            ▼<linearlayout>
                <viewstub id="#102036e"></viewstub>
              ▼<framelayout>
                ▼
                <android.support.v7.internal.widget.fitwindowslinearlayo
                ut id="@id/action_bar_root">
                    <android.support.v7.internal.widget.viewstubcompat
                    id="@id/
                    action_mode_bar_stub"></android.support.v7.internal.w
                    idget.viewstubcompat>
                  ▼
                  <android.support.v7.internal.widget.nativeactionmodeaw
                  arelayout id="@android:id/content">
                    ▼<framelayout>
                      ▼<android.support.v7.widget.recyclerview id="@id/
                      recipe_detail_list">
                        ▼<linearlayout>
                          ▶<framelayout>…</framelayout>
                          ▼<linearlayout>
                              <edittext id="@id/recipe_title_edit_text"
                              text="Tapas y aperitivos
                              españoles"></edittext>
                            ▶
                            <com.cookpad.android.global.views.bookmarkbut
                            ton id="@id/bookmark_button">
                            …</com.cookpad.android.global.views.bookmarkb
                            utton>
                            </linearlayout>
                          ▶<linearlayout id="@id/user_info_container">
                          …</linearlayout>
                          </linearlayout>
```

... linearlayout linearlayout edittext#@id/recipe_title_edit_text

```
▼ EditText
  ▶ Object.shadow$_klass_: Class
    Object.shadow$_monitor_: -1330531768
    TextView.mAllowTransformationLengthChange: false
    TextView.mAutoLinkMask: 0
  ▶ TextView.mBoring: Metrics
  ▶ TextView.mBufferType: BufferType
  ▶ TextView.mChangeWatcher: ChangeWatcher
    TextView.mCharWrapper: null
    TextView.mCurHintTextColor: -2368562
    TextView.mCurTextColor: -7623424
    TextView.mCurrentSpellCheckerLocaleCache: null
    TextView.mCursorDrawableRes: 17303296
    TextView.mDeferScroll: -1
    TextView.mDesiredHeightAtMeasure: 196
    TextView.mDispatchTemporaryDetach: false
    TextView.mDrawables: null
  ▶ TextView.mEditableFactory: Factory
  ▶ TextView.mEditor: Editor
    TextView.mEllipsize: null
  ▶ TextView.mFilters: array
    TextView.mFreezesText: false
    TextView.mGravity: 8388627
    TextView.mHighlightColor: 1711314568
  ▶ TextView.mHighlightPaint: Paint
    TextView.mHighlightPath: null
    TextView.mHighlightPathBogus: true
    TextView.mHint: "Añade un título"
  ▶ TextView.mHintBoring: Metrics
  ▶ TextView.mHintLayout: BoringLayout
  ▶ TextView.mHintTextColor: ColorStateList
    TextView.mHorizontallyScrolling: false
    TextView.mIncludePad: true
    TextView.mLastLayoutDirection: 0
    TextView.mLastScroll: 0
  ▶ TextView.mLayout: DynamicLayout
  ▶ TextView.mLinkTextColor: ColorStateList
```

```
   _____/\\\\\\\\\\\_______________________________________________/\\\_______________________
    ___/\\\/////////\\\____________________________________________\/\\\_______________________
     __\//\\\______\///______/\\\___________________________/\\\______\/\\\_______________________
      ___\////\\\__________/\\\\\\\\\\\_____/\\\\\\\\___/\\\\\\\\\\\_\/\\\_____________/\\\\\____
       ______\////\\\______\////\\\////____/\\\/////\\\_\////\\\////__\/\\\\\\\\\\____/\\\///\\\__
        _________\////\\\______\/\\\_______/\\\\\\\\\\\_____\/\\\______\/\\\/////\\\__/\\\__\//\\\_
         __/\\\______\//\\\_____\/\\\_/\\__\//\\///////______\/\\\_/\\__\/\\\___\/\\\_\//\\\__/\\\__
          _\///\\\\\\\\\\\/______\//\\\\\___\//\\\\\\\\\\____\//\\\\\___\/\\\___\/\\\__\///\\\\\/___
           ___\///////////_________\/////_____\//////////______\/////____\///____\///_____\/////_____
            Welcome to Stetho
             Attached to com.cookpad.android.global
```



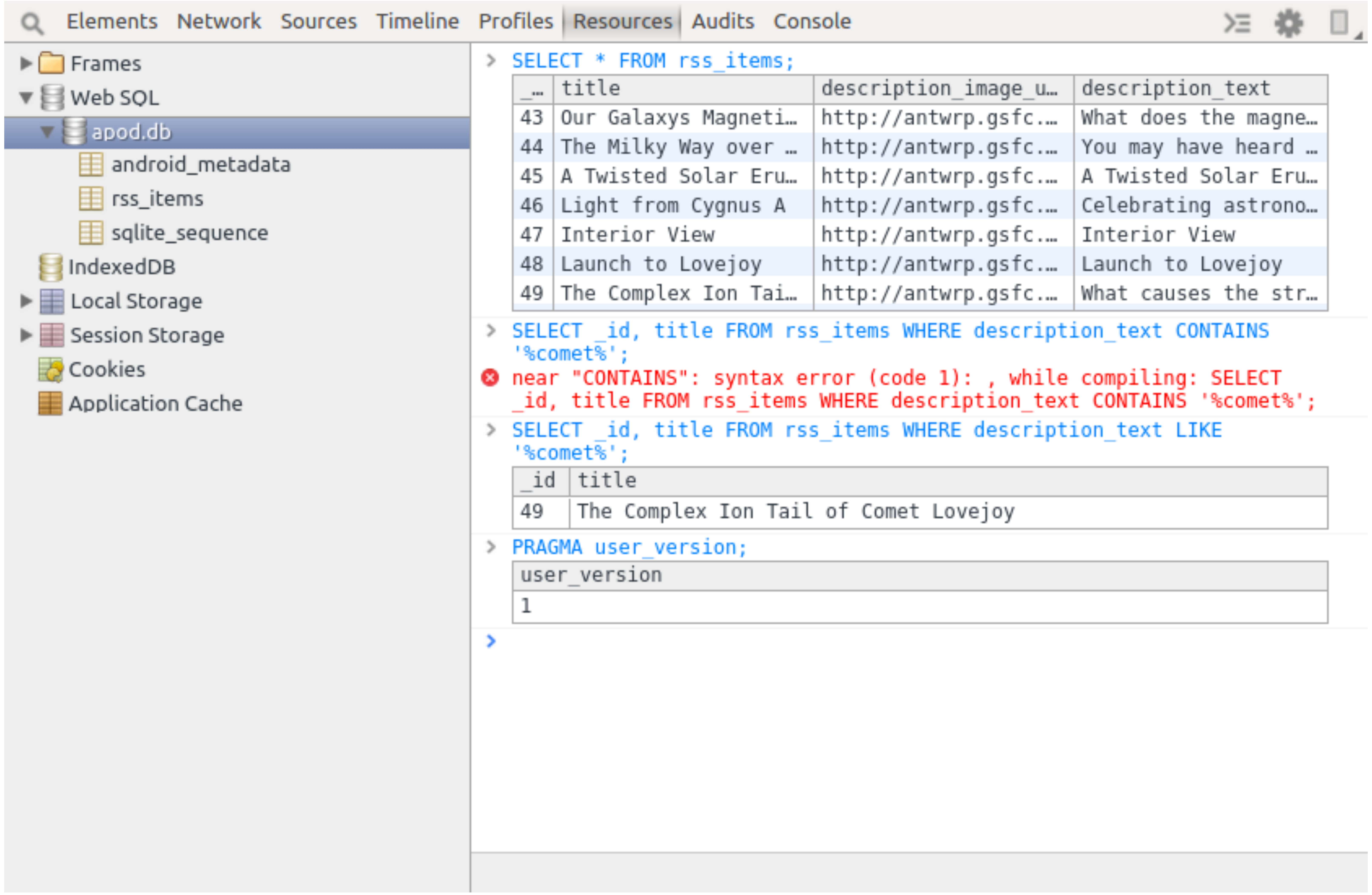
Tapas y aperitivos españoles

Cuqui

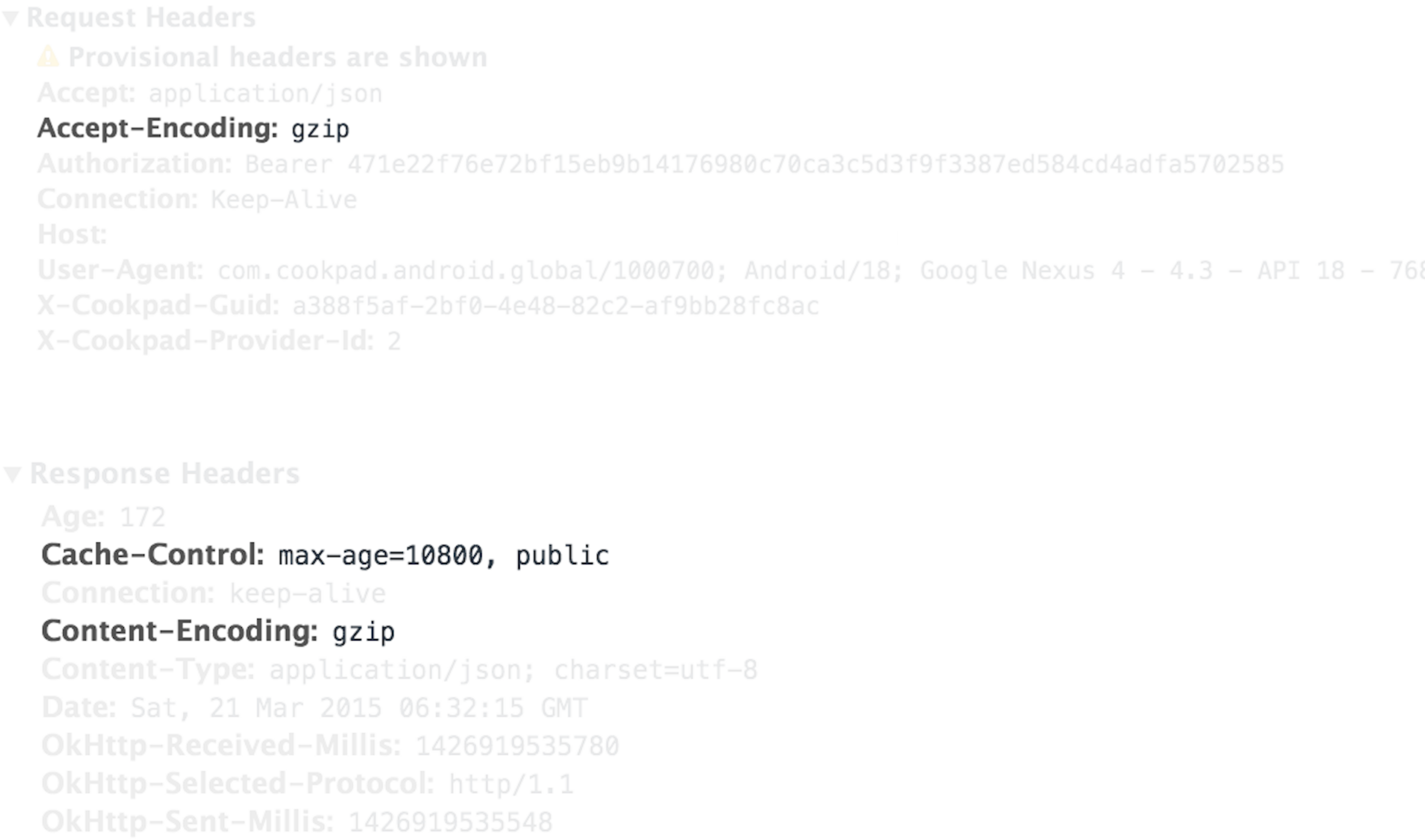
Ingredientes Comensales 8

1 kg	mejillones grandes cocidos
1	tomate rojo duro bien picadito

We can access SQLite database



```
> SELECT * FROM rss_items;
 _…  | title                  | description_image_u…  | description_text
 43  | Our Galaxys Magneti…   | http://antwrp.gsfc.…  | What does the magne…
 44  | The Milky Way over …   | http://antwrp.gsfc.…  | You may have heard …
 45  | A Twisted Solar Eru…   | http://antwrp.gsfc.…  | A Twisted Solar Eru…
 46  | Light from Cygnus A    | http://antwrp.gsfc.…  | Celebrating astrono…
 47  | Interior View          | http://antwrp.gsfc.…  | Interior View
 48  | Launch to Lovejoy      | http://antwrp.gsfc.…  | Launch to Lovejoy
 49  | The Complex Ion Tai…   | http://antwrp.gsfc.…  | What causes the str…
> SELECT _id, title FROM rss_items WHERE description_text CONTAINS
'%comet%';
near "CONTAINS": syntax error (code 1): , while compiling: SELECT
_id, title FROM rss_items WHERE description_text CONTAINS '%comet%';
> SELECT _id, title FROM rss_items WHERE description_text LIKE
'%comet%';
 _id | title
 49  | The Complex Ion Tail of Comet Lovejoy
> PRAGMA user_version;
 user_version
 1
>
```



```
▼ Request Headers
   ⚠ Provisional headers are shown
   Accept: application/json
   Accept-Encoding: gzip
   Authorization: Bearer 471e22f76e72bf15eb9b14176980c70ca3c5d3f9f3387ed584cd4adfa5702585
   Connection: Keep-Alive
   Host:
   User-Agent: com.cookpad.android.global/1000700; Android/18; Google Nexus 4 - 4.3 - API 18 - 768
   X-Cookpad-Guid: a388f5af-2bf0-4e48-82c2-af9bb28fc8ac
   X-Cookpad-Provider-Id: 2


▼ Response Headers
   Age: 172
   Cache-Control: max-age=10800, public
   Connection: keep-alive
   Content-Encoding: gzip
   Content-Type: application/json; charset=utf-8
   Date: Sat, 21 Mar 2015 06:32:15 GMT
   OkHttp-Received-Millis: 1426919535780
   OkHttp-Selected-Protocol: http/1.1
   OkHttp-Sent-Millis: 1426919535548
```

Compressing Data

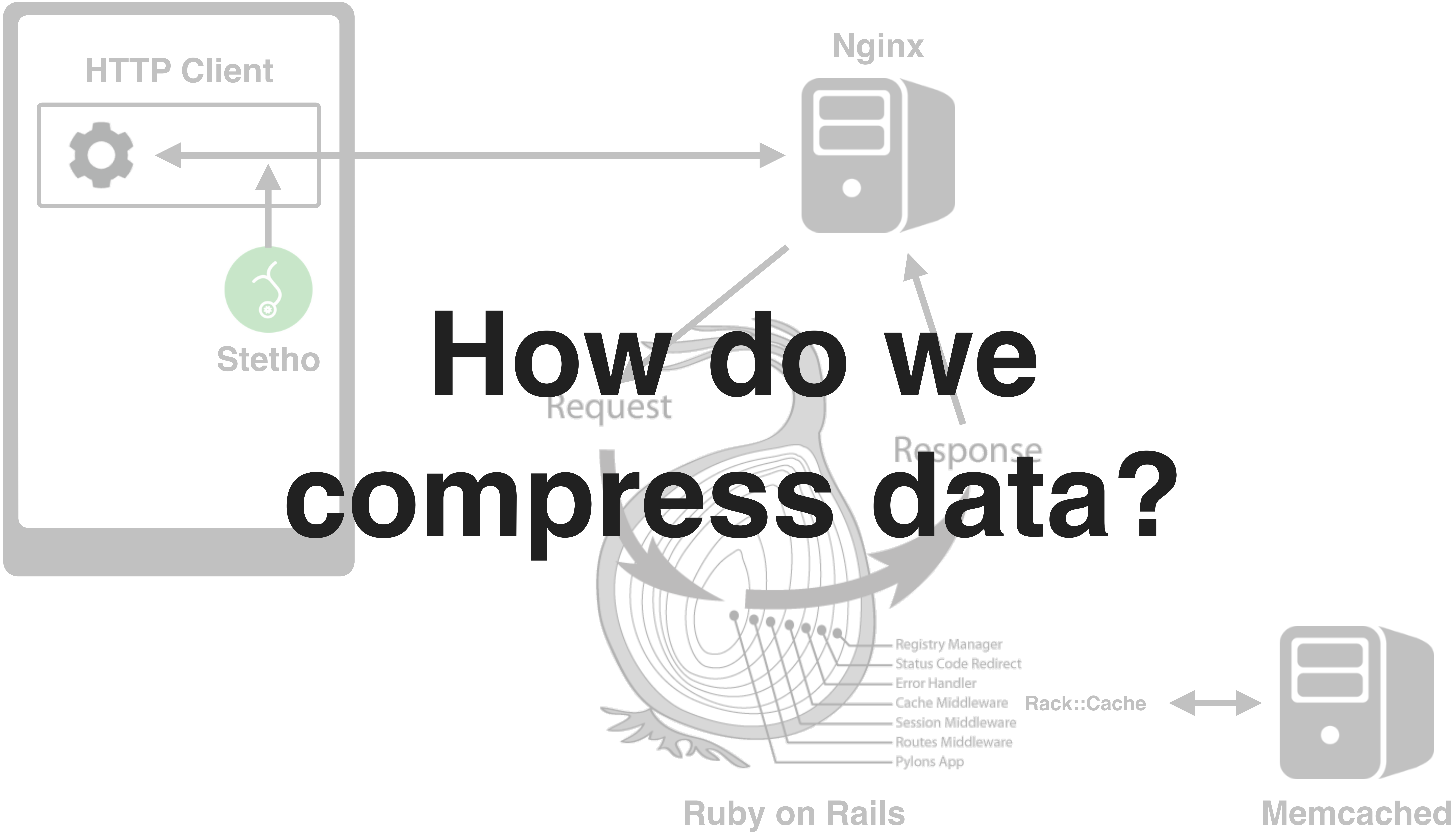
An easy and convenient way to reduce the bandwidth

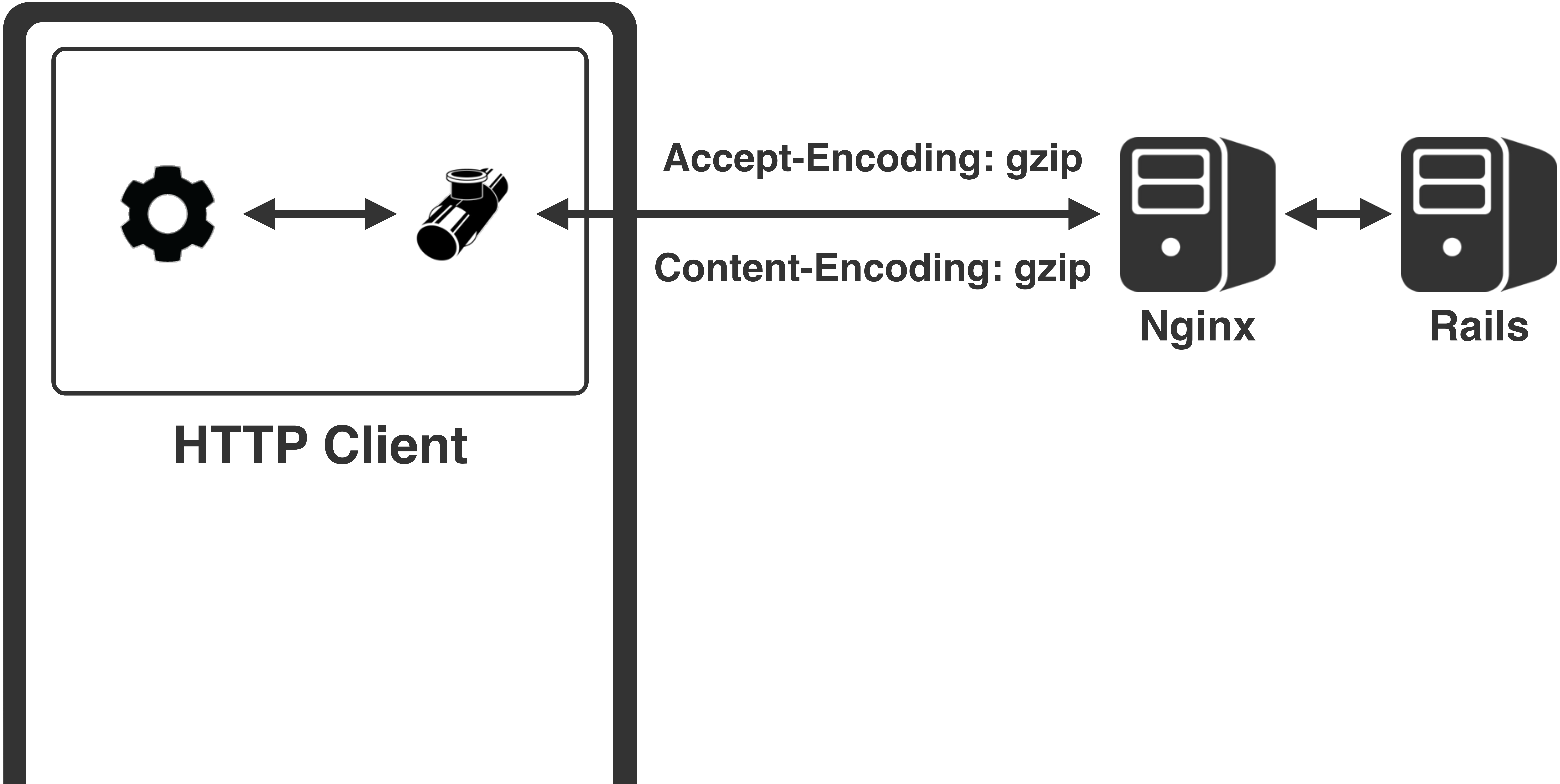
Compression is a simple, effective way

GZIP reduce the size of response

90%

How do we compress data?





Accept-Encoding: gzip

Content-Encoding: gzip

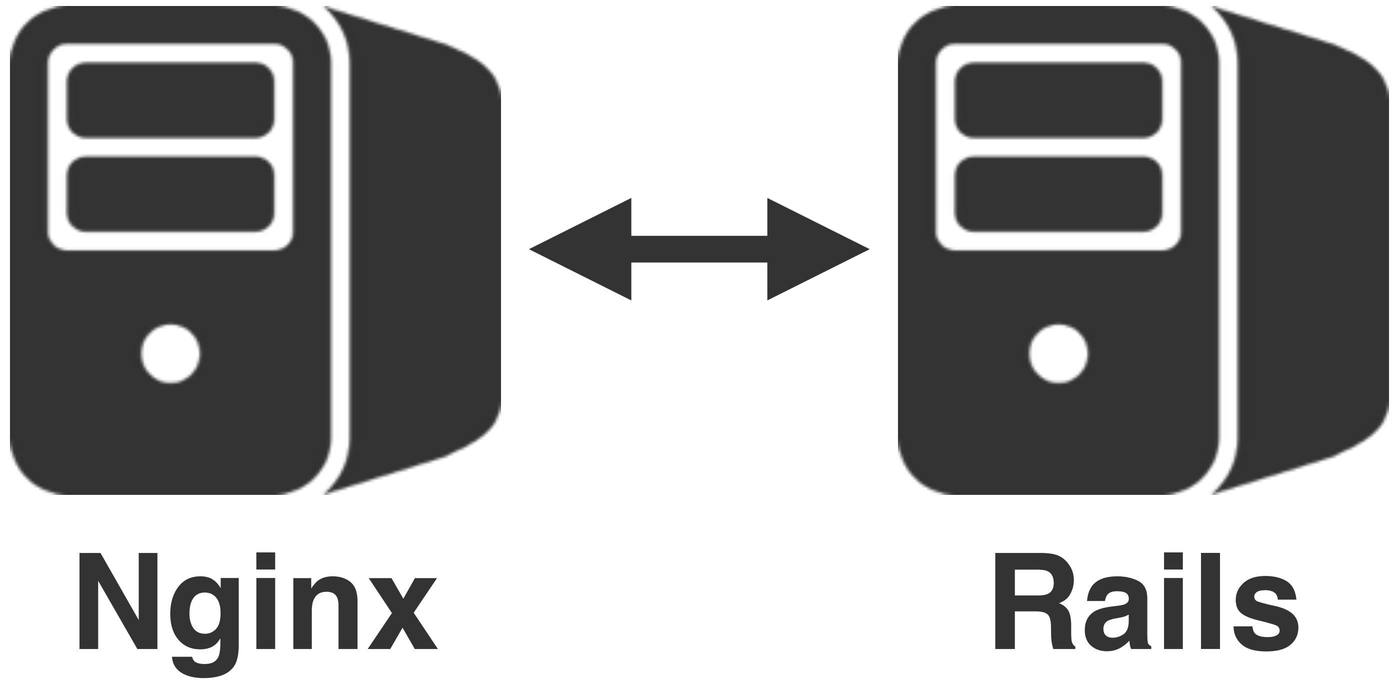
Nginx

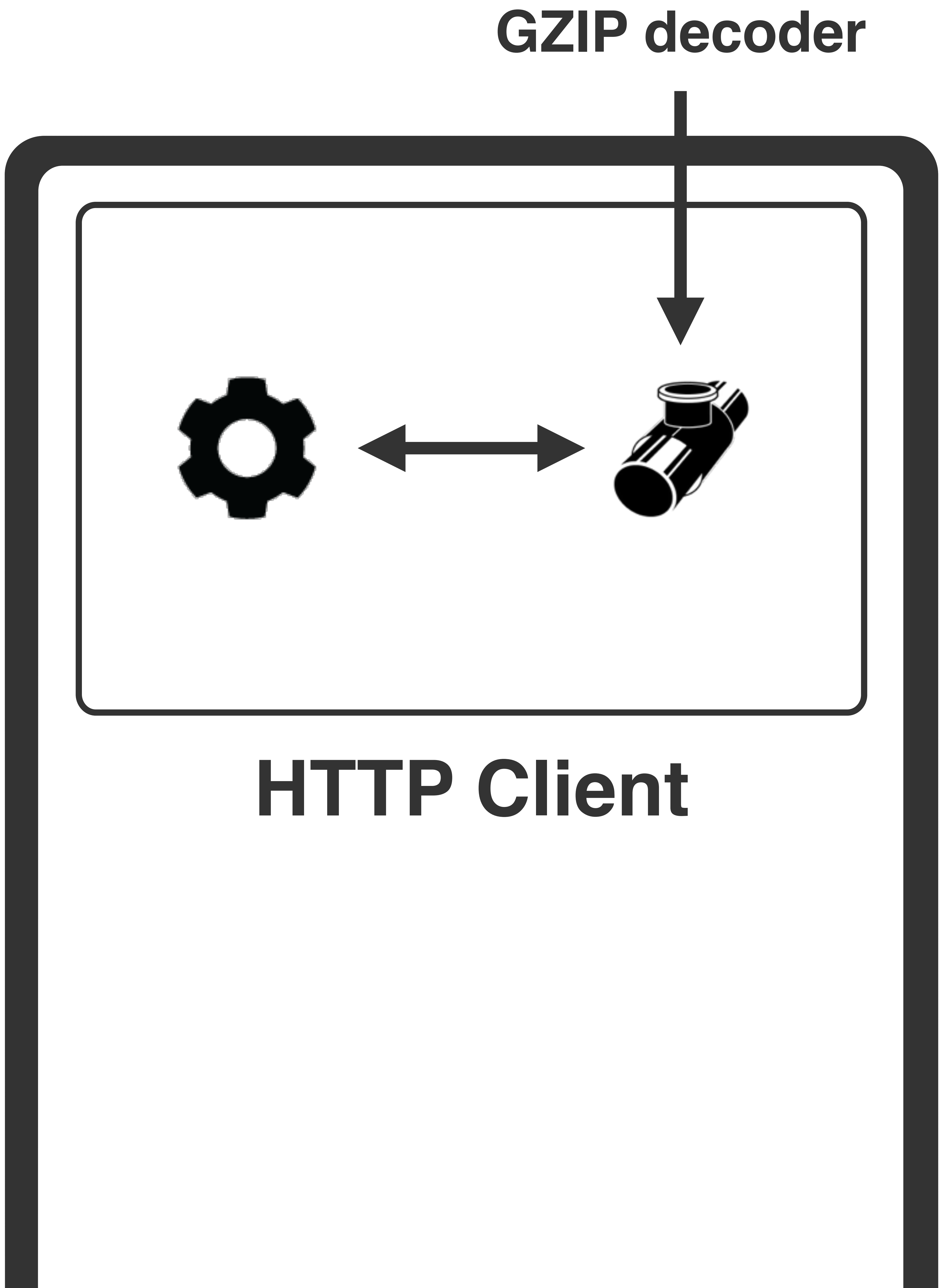
Rails

HTTP Client

nginx.conf

```
http {
  ...
  gzip on;
  gzip_disable "msie6";

  gzip_vary on;
  gzip_proxied any;
  gzip_comp_level 6;
  gzip_buffers 16 8k;
  gzip_http_version 1.1;
  gzip_types text/plain text/css application/json
}
```





```
// Set "Accept-Encoding: gzip" when you send a request
connection.setRequestProperty(
        "Accept-Encoding", “gzip");

// Decompress input stream when you receive a response
inputStream = new GZIPInputStream(
        connection.getInputStream());
```

HTTP clients for Android

Don’t support GZIP by default

- AndroidHttpClient
- HttpUrlConnection
- OkHttp

support GZIP by default

HTTP clients for Android

No longer maintained

@Deprecated

- ~~AndroidHttpClient~~
- HttpUrlConnection
- OkHttp

We had used Volley
as API client before

Volley has 2 HTTP clients internally

Volley

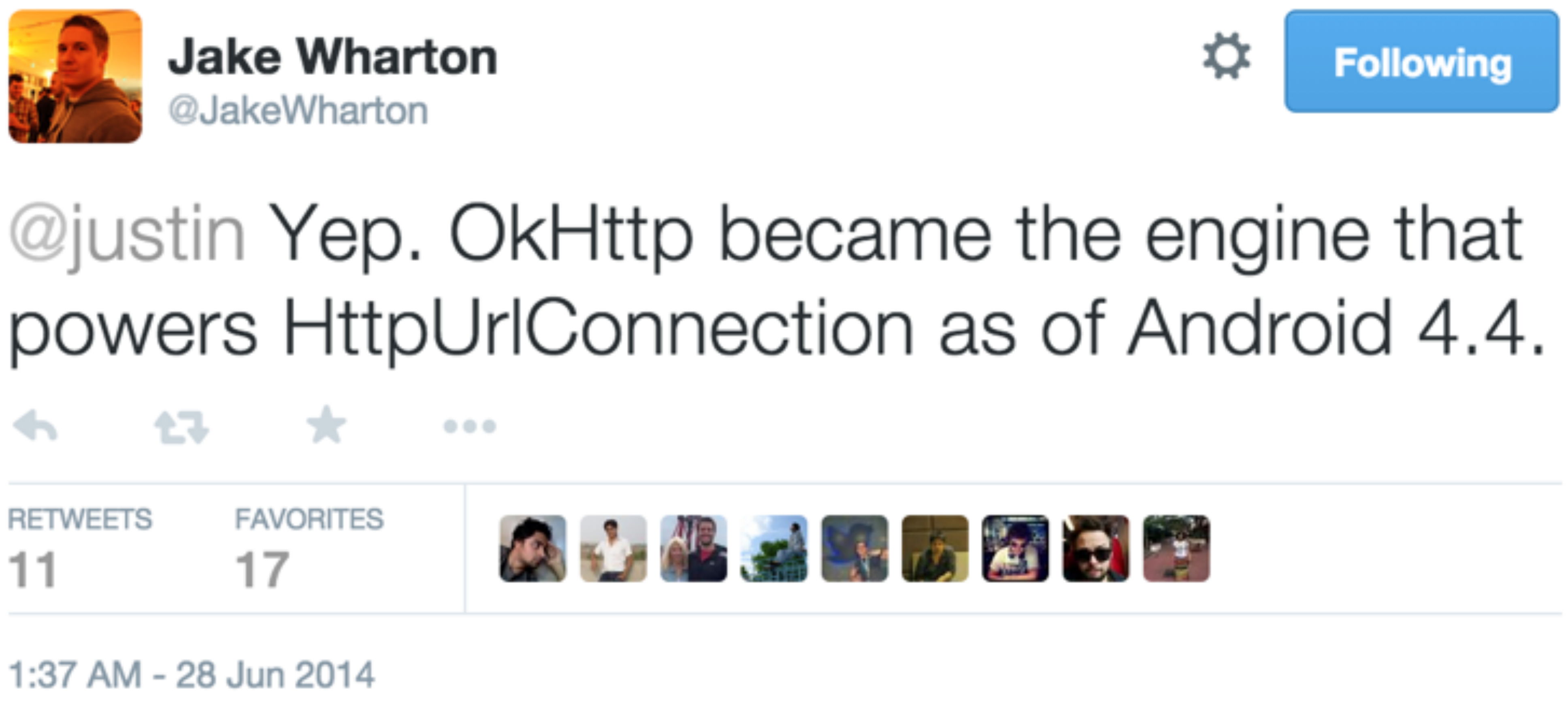
2.3+: HttpUrlConnection
<2.2: AndroidHttpClient

```
public static RequestQueue newRequestQueue(…) {
        …
        if (stack == null) {
            if (Build.VERSION.SDK_INT >= 9) {
                // use HttpUrlConnection
                stack = new HurlStack();
            } else {
                // use AndroidHttpClient
                stack = new HttpClientStack(AndroidHttpClie
            }
        }
```

HttpUrlConnection uses OkHttp internally

HttpUrlConnection

4.4+: OkHttp
<4.4: HttpUrlConnection



Jake Wharton
@JakeWharton

@justin Yep. OkHttp became the engine that powers HttpUrlConnection as of Android 4.4.

RETWEETS 11
FAVORITES 17

1:37 AM - 28 Jun 2014

Different behavior of HTTP clients

Inside of Volley

4.4+: OkHttp

<4.4: HttpUrlConnection

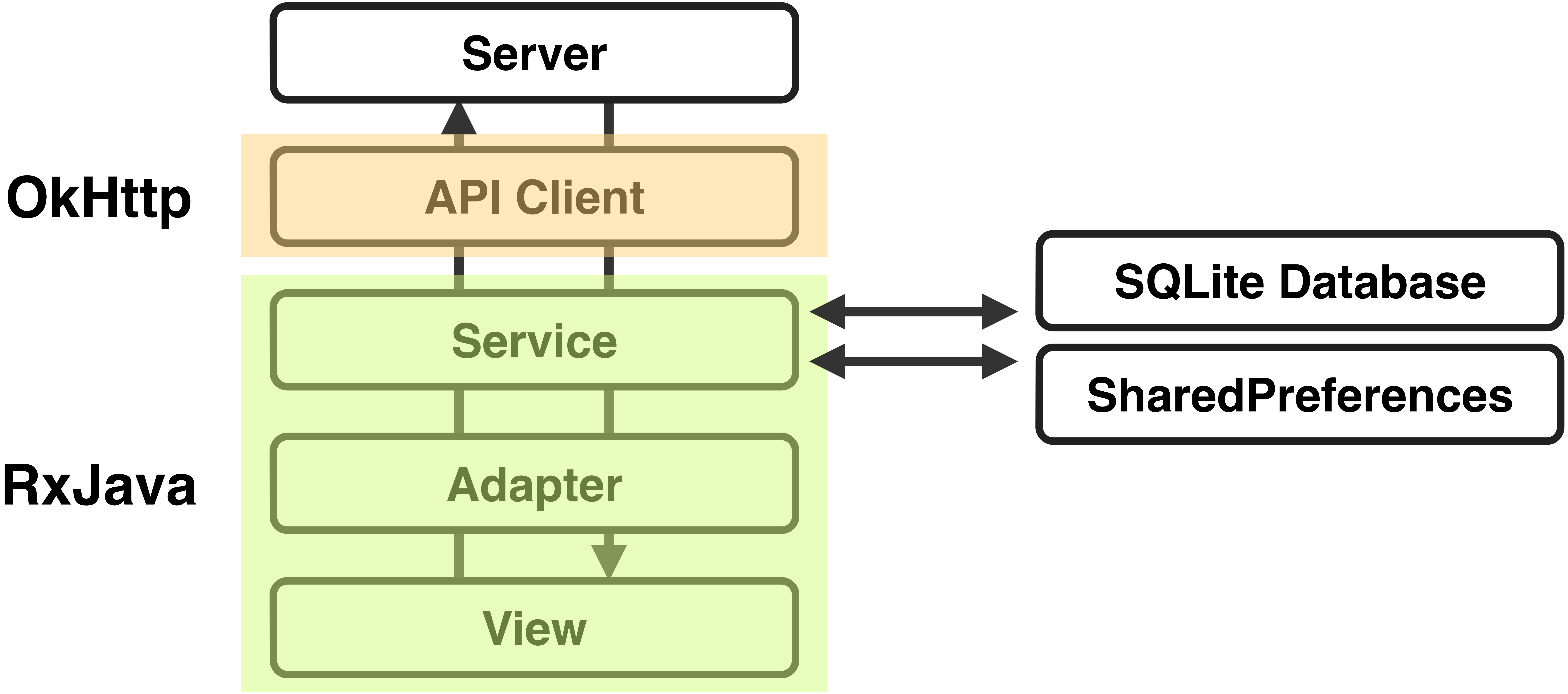
<2.3: AndroidHttpClient

Simple is better

I recommend to use OkHttp

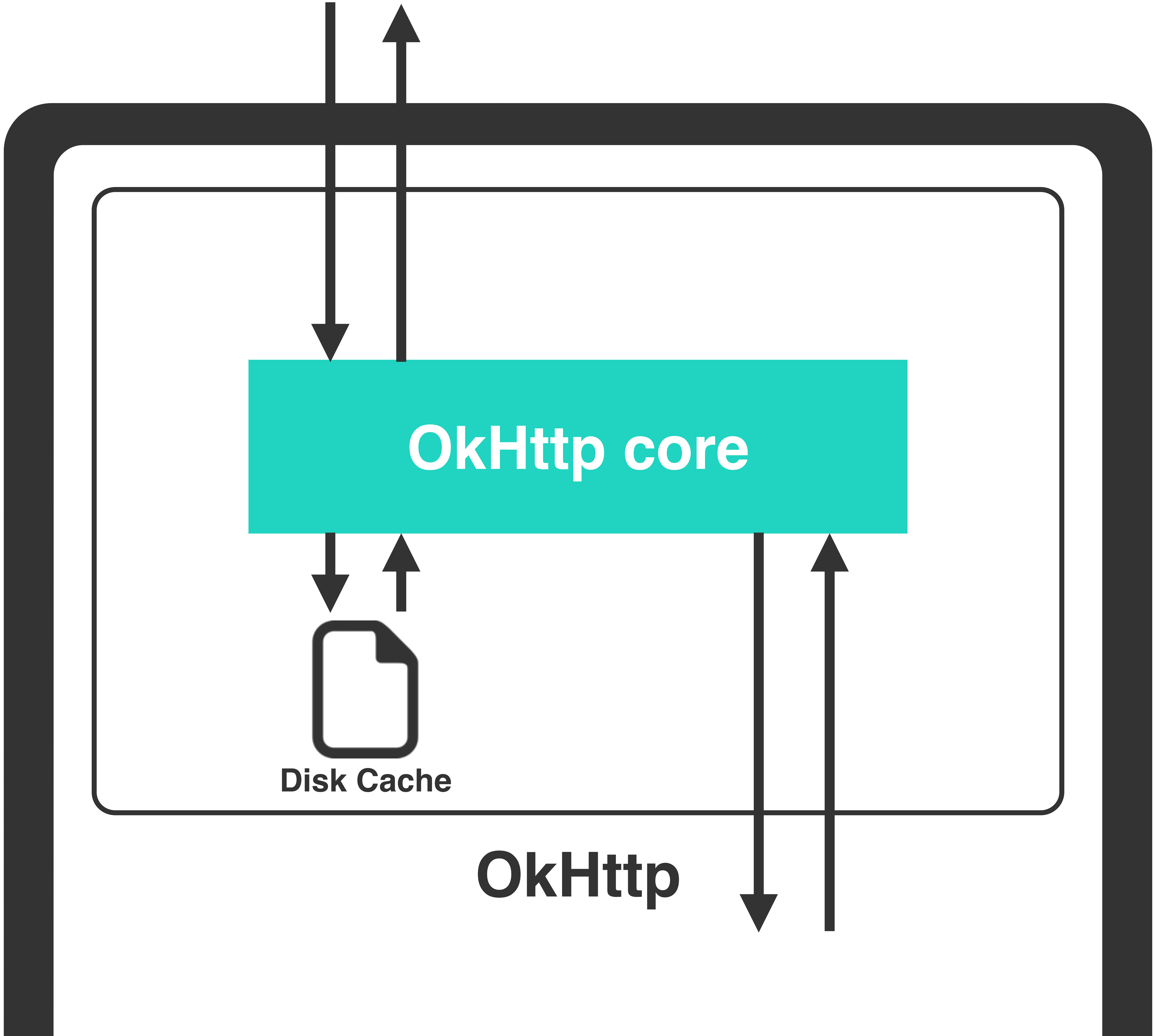
* GZIP
* Connection Pool
* WebSocket
* HTTP/2.0

OkHttp + RxJava = Reactive Data Store



Caching Data

Effective cache controls will dramatically reduce server load


OkHttp core
Disk Cache
OkHttp

Caching in HTTP

```
cache-request-directive =
       "no-cache"
     | "no-store"
     | "max-age" "=" delta-seconds
     | "max-stale" [ "=" delta-seconds ]
     | "min-fresh" "=" delta-seconds
     | "no-transform"
     | "only-if-cached"
     | cache-extension
```

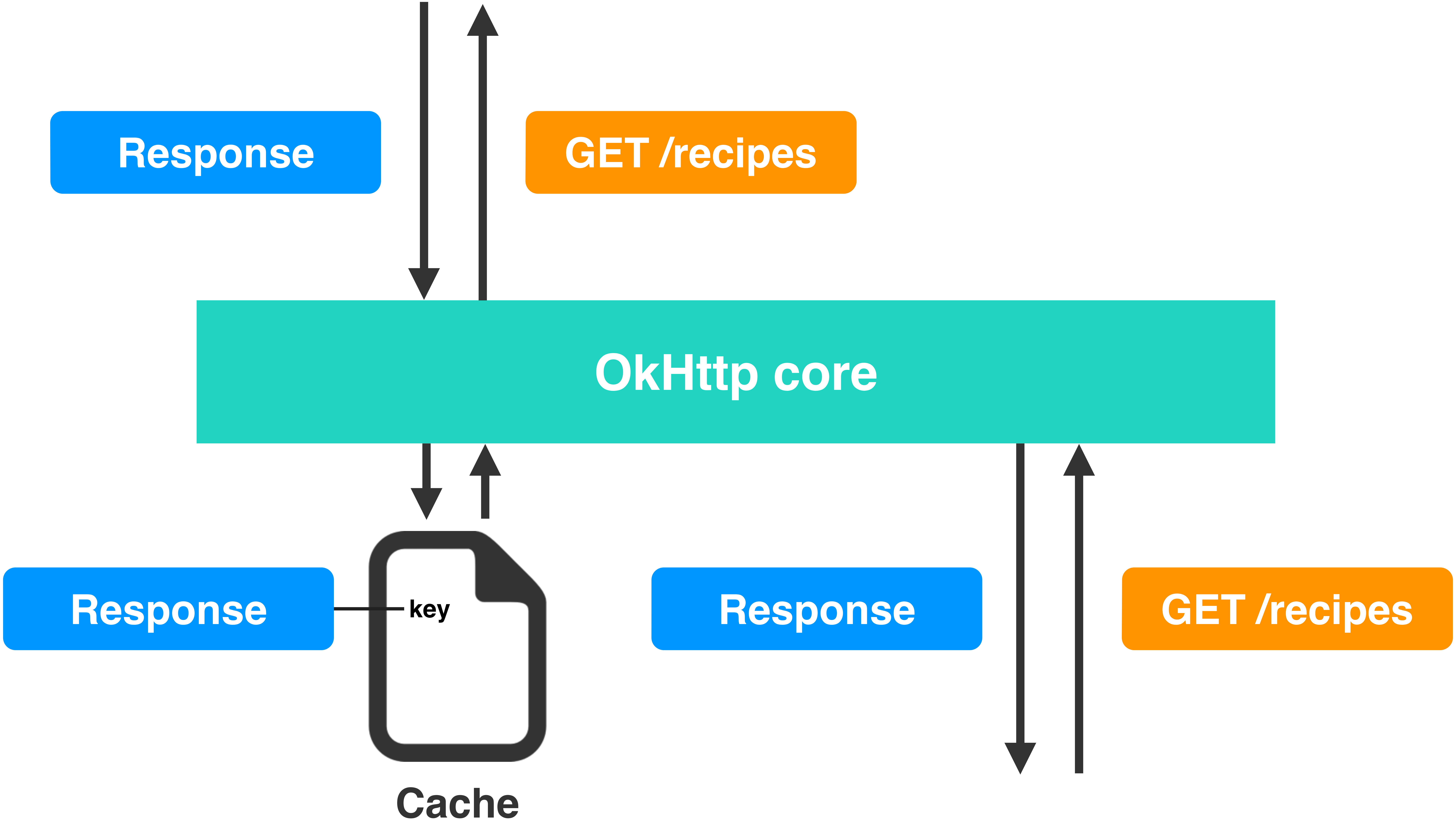
```
cache-response-directive =
       "public"
     | "private" [ "=" <"> 1#field-name <"> ]
     | "no-cache" [ "=" <"> 1#field-name <"> ]
     | "no-store"
     | "no-transform"
     | "must-revalidate"
     | "proxy-revalidate"
     | "max-age" "=" delta-seconds
     | "s-maxage" "=" delta-seconds
     | cache-extension
```

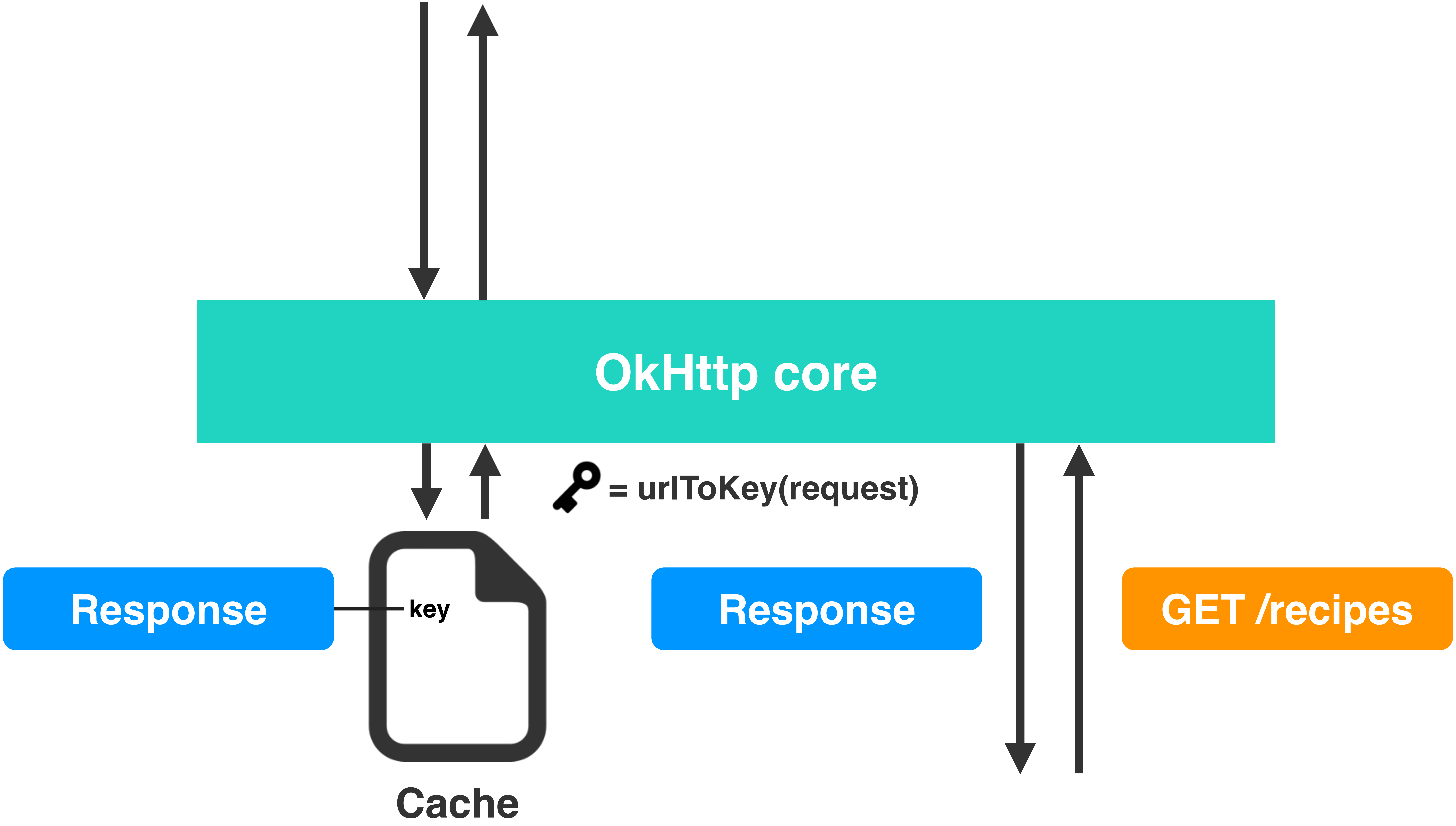
Enable cache

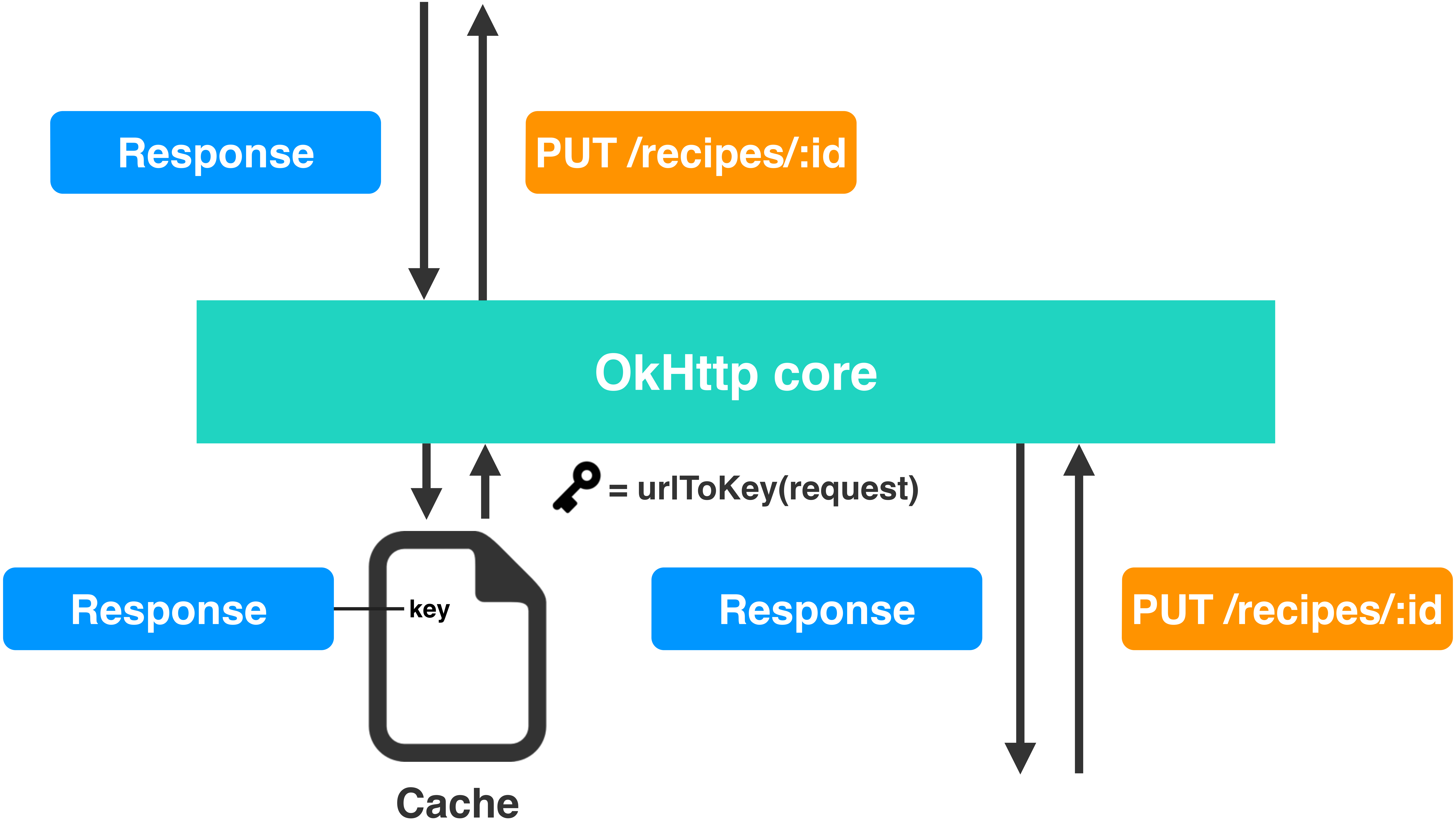
```
OkHttpClient client = new OkHttpClient();
Cache cache = new Cache(cacheDir, MAX_CACHE_SIZE);
client.setCache(cache);
```

```
# default
# => Cache-Control: max-age=0, private, must-revalidate

expires_in(1.hour, public: true)
# => Cache-Control: max-age=3600, public

expires_now
# => Cache-Control: no-cache
```

Rails

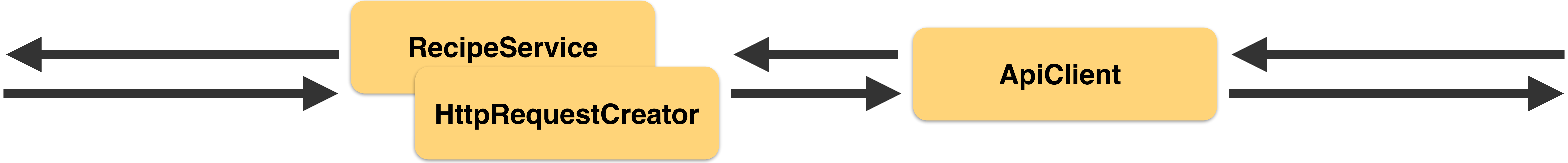

Response
GET /recipes
OkHttp core
Response
key
Cache
Response
GET /recipes


OkHttp core
🔑 = urlToKey(request)
Response
key
Cache
Response
GET /recipes


Response
PUT /recipes/:id
OkHttp core
🔑 = urlToKey(request)
Response
key
Cache
Response
PUT /recipes/:id

Cache-Control: no-cache

**In some situations,
such as after a user clicks a 'refresh' button,
it may be necessary to skip the cache,
and fetch data directly from the server**



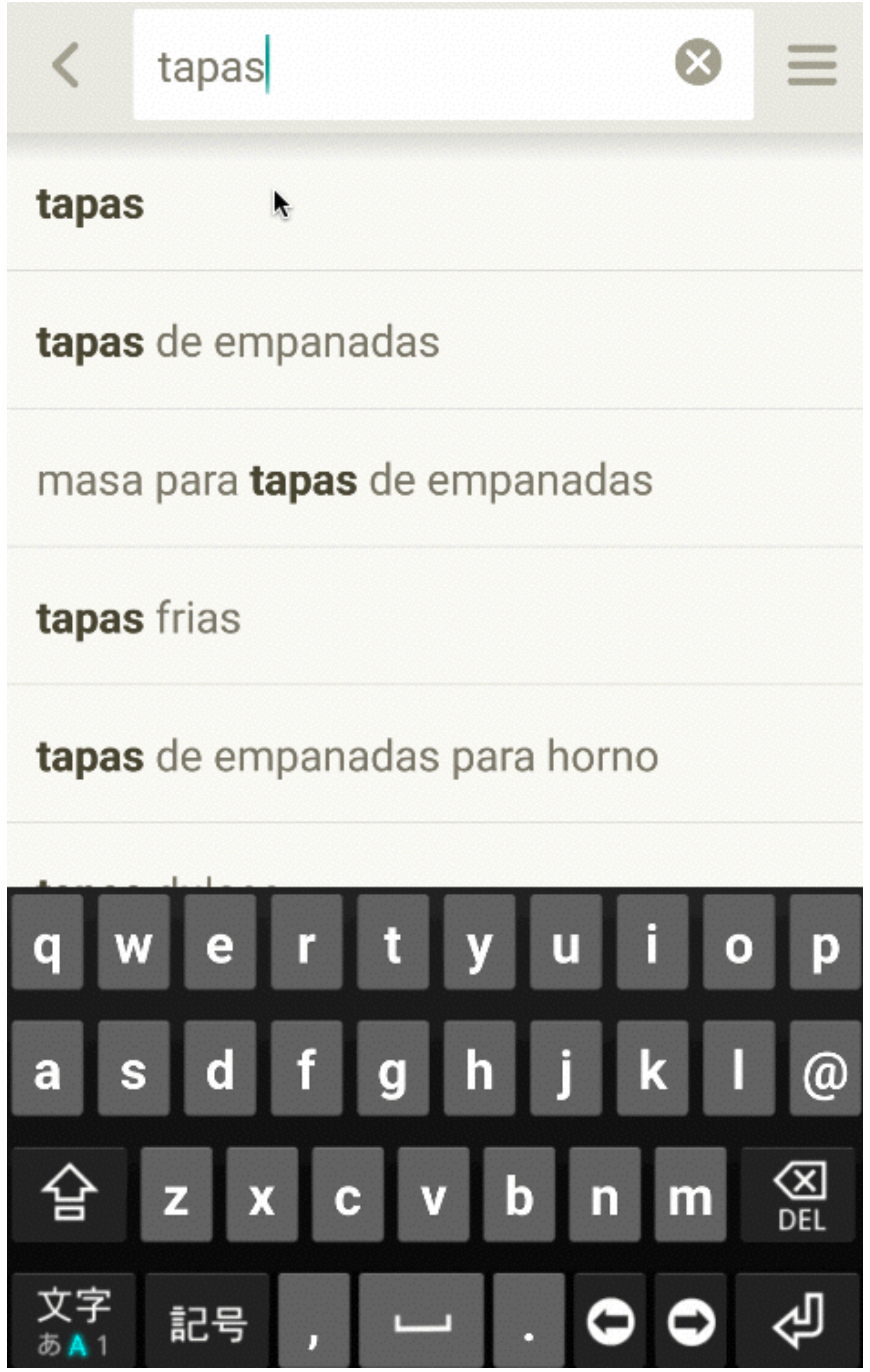
RecipeService

HttpRequestCreator

ApiClient

```
// RecipeService.java
public Observable<Response<Recipe>> get(…) {
    ...
    return request(GET, “/recipes/:id”)
            .noCache()
            .noStore()
            .to(RECIPE);
}
```

```
// ApiClient.java
if (isConnected) {
    headers.put(CACHE_CONTROL, “only-if-cached");
} else if (noCache && noStore) {
    headers.put(CACHE_CONTROL, "no-cache, no-store");
} else if (noCache) {
    headers.put(CACHE_CONTROL, "no-cache");
} else if (noStore) {
    headers.put(CACHE_CONTROL, "no-store");
}
```



tapas

tapas

tapas de empanadas

masa para tapas de empanadas

tapas frias

tapas de empanadas para horno

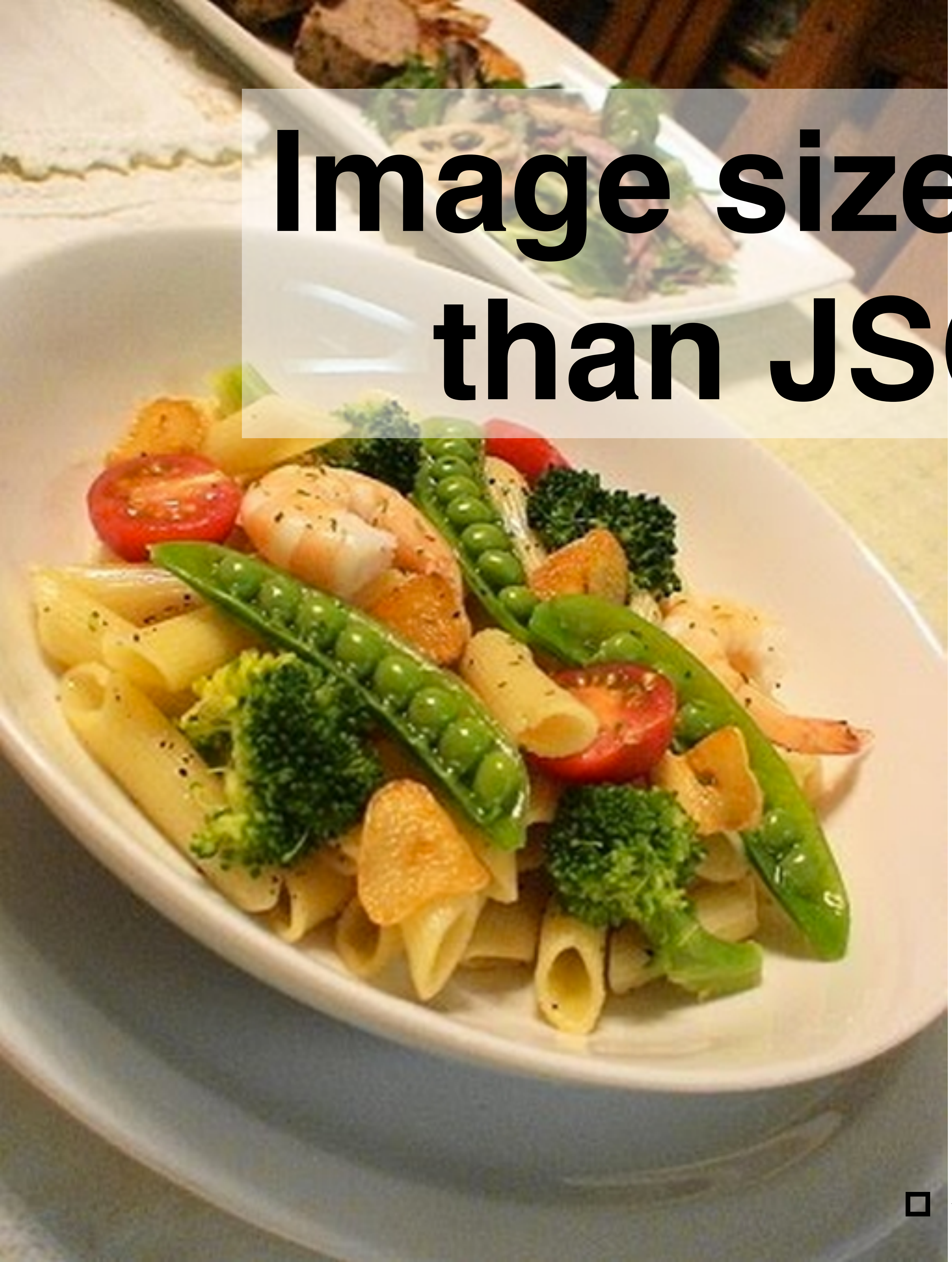
Users can see
contents quickly
even if device
is not connected

To enjoy the benefits of caching, you need to write carefully crafted cache control policies

Object Type	Duration
Categories	1 day
Search recipes	3 hours
Users	Do not cache

Image Optimization

Image size is much larger than JSON response



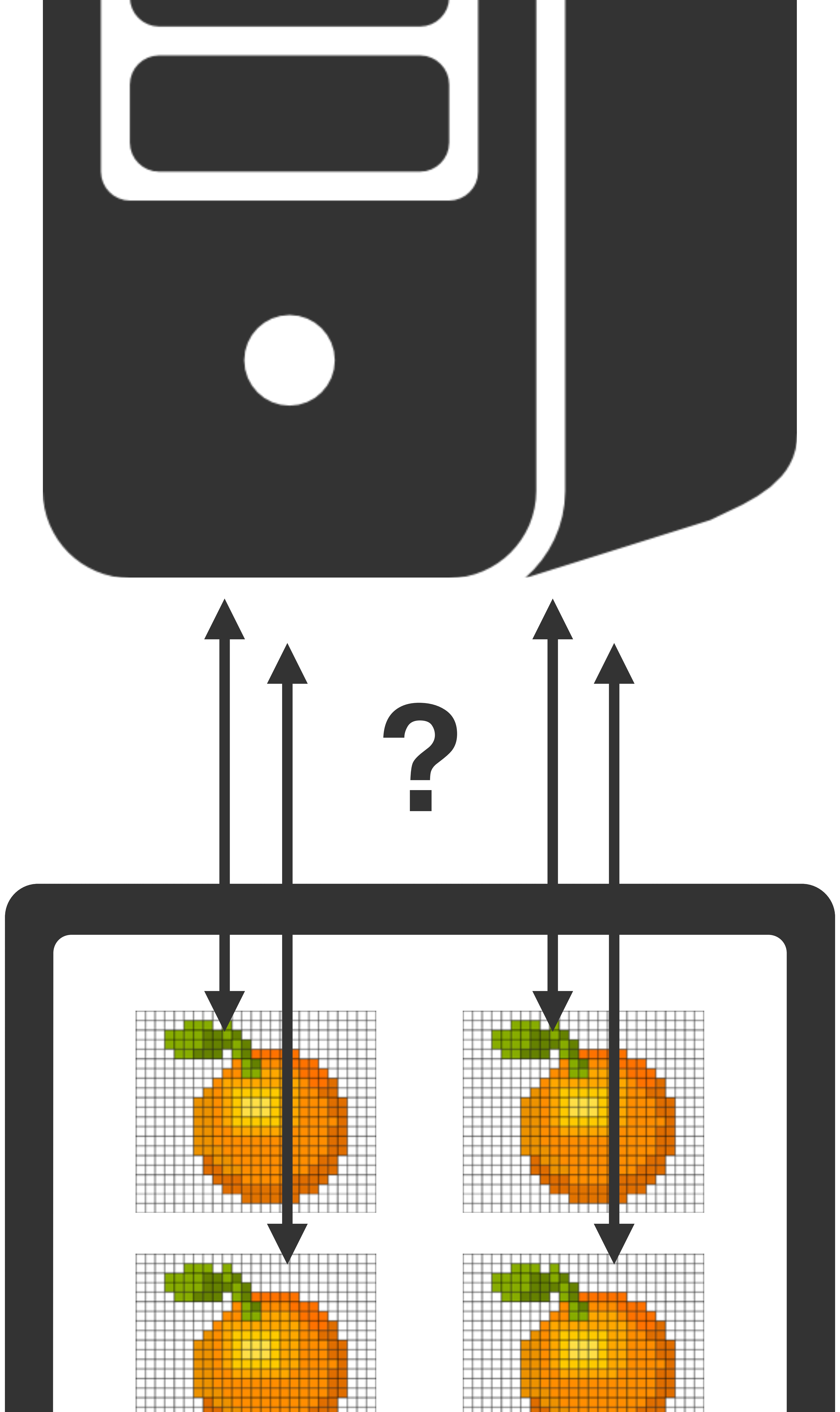
{"result":{"id":1,"title":"Penne with Spring Vegetables”,”description”:”..."

□ ← **Each pixel takes up 4 bytes**

We need to know
what image loading is

Simple Image Loading

- Specify URL to HTTP client
- Get Input Steam
- Decode Input Stream to Bitmap
- Set Bitmap to ImageView



Do you fetch images from the server every time you want to display images?

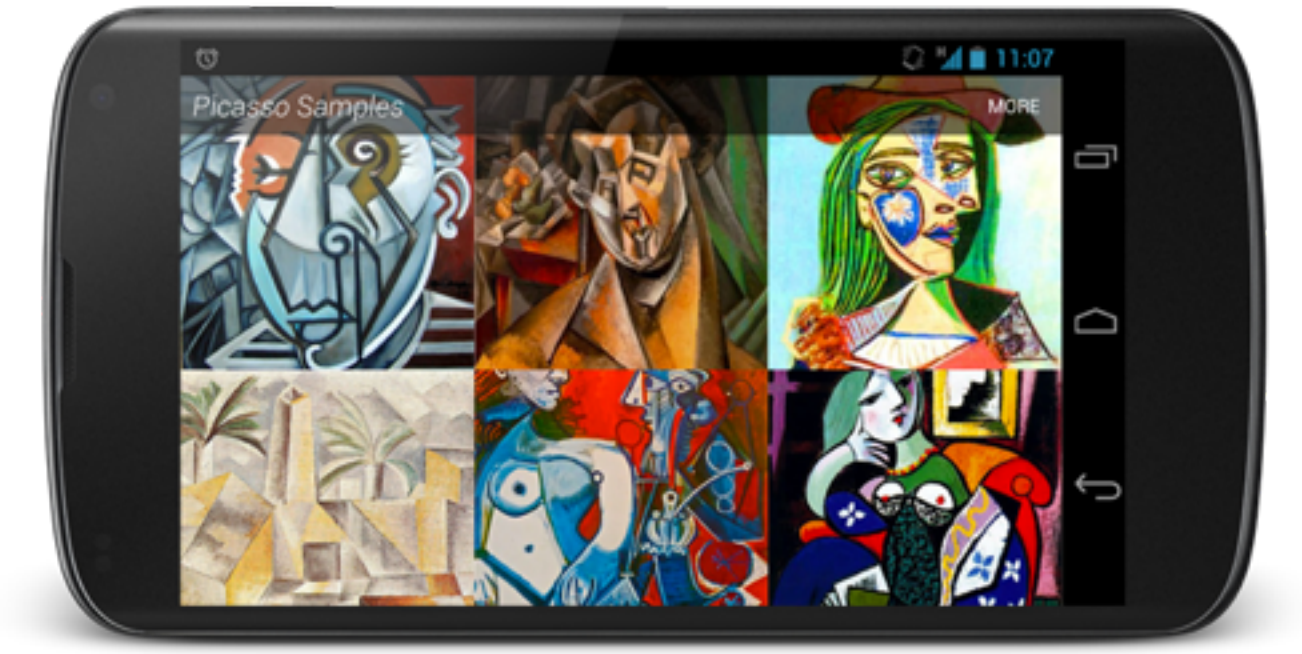
The answer may be

“NO”

In addition, we want to

- reuse worker threads
- set the priority of requests
- cache decoded images

There are some great libraries



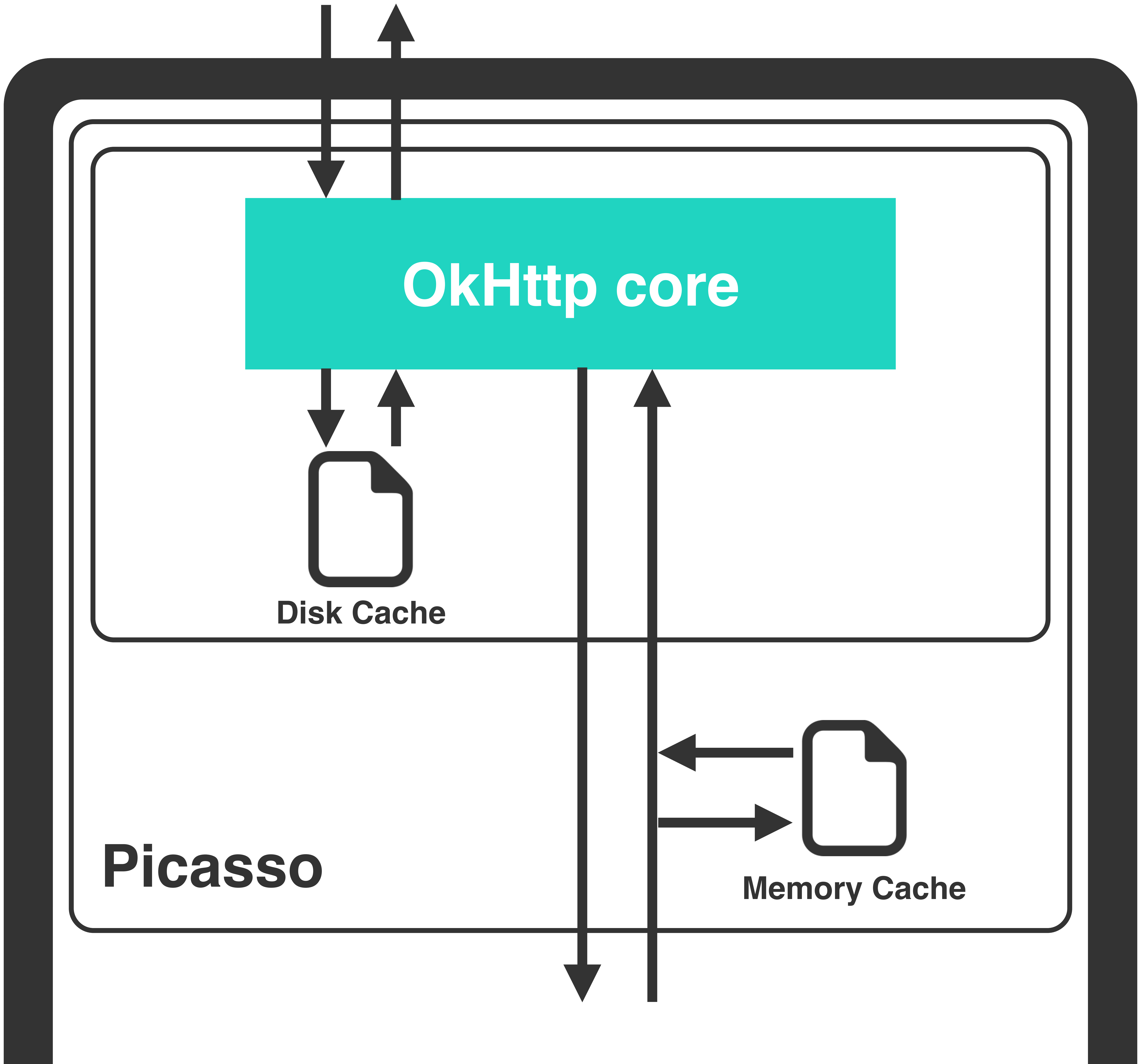
Picasso

glide

Fresco

Caching Data

The best way to display images quickly


OkHttp core
Disk Cache
Picasso
Memory Cache

Expiration time

Expiration times of cache is also following cache controls

Enable cache

Picasso setup cache automatically
You don’t need to do anything

Thread Pool

Creating new threads for each task incur the overhead

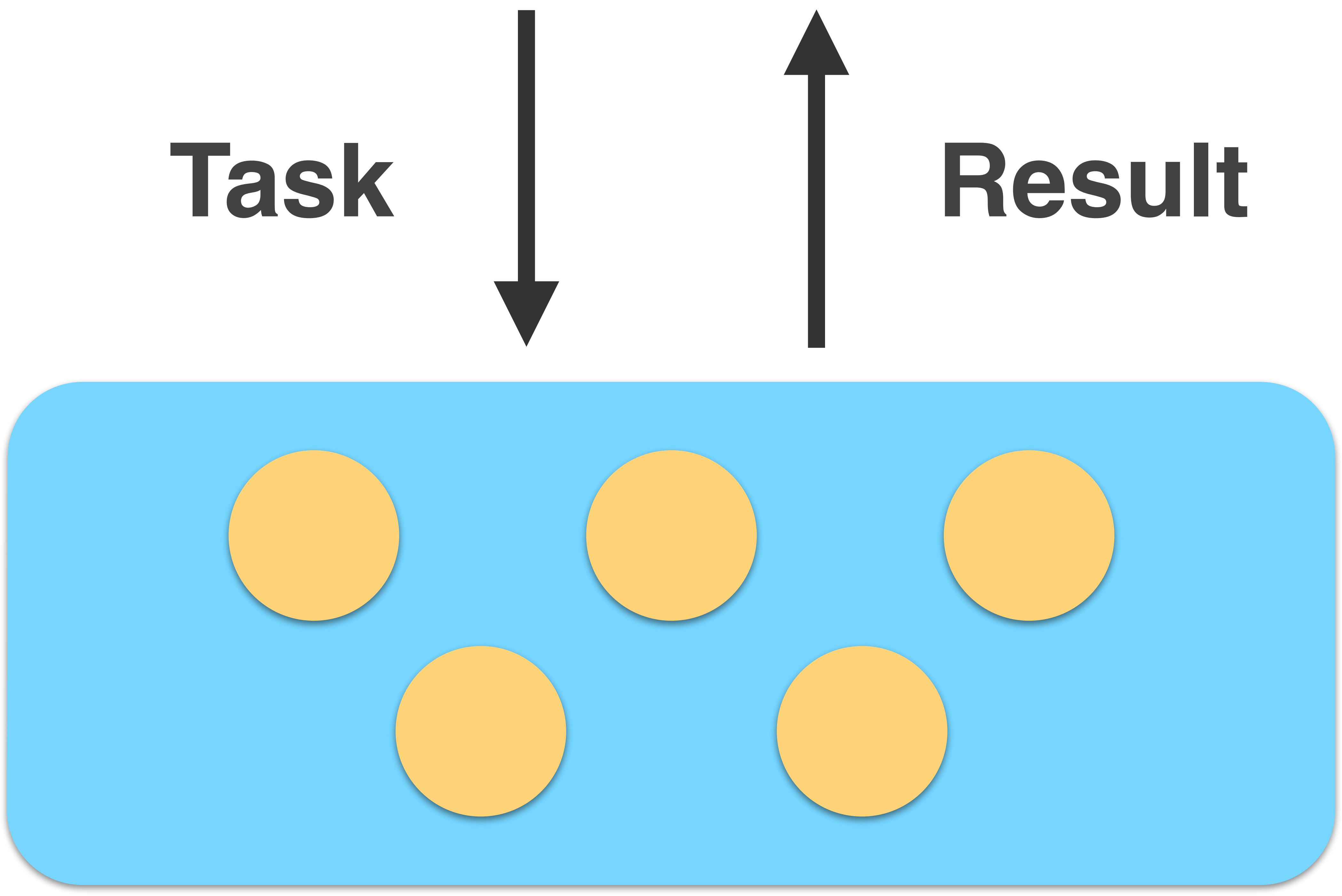
Main Thread

Worker Thread

CloudFront

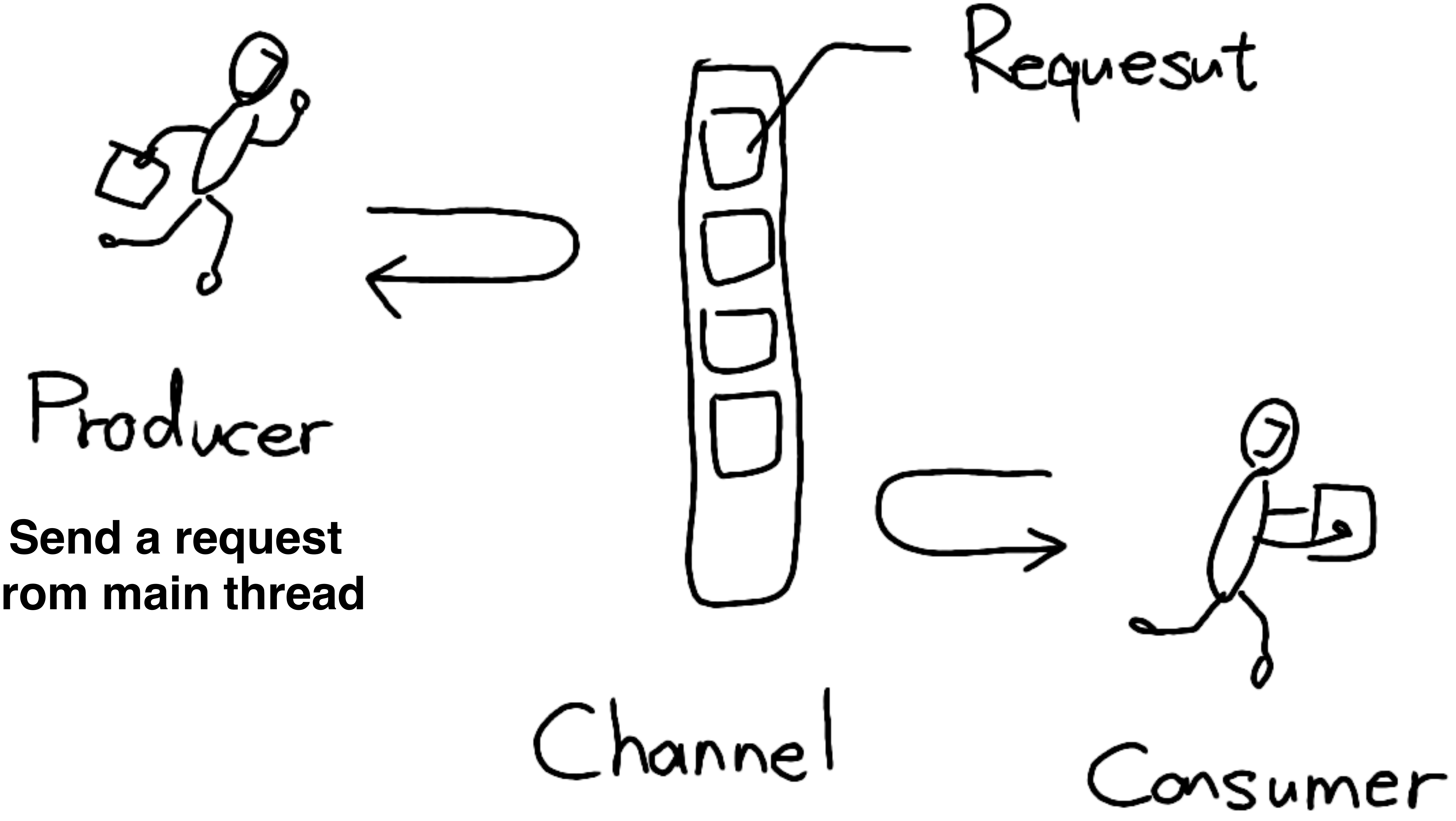
Request Image

- Transform
- Decode
- Cache



```
new ThreadPoolExecutor(
        corePoolSize, // The number of threads to keep in the pool
        maximumPoolSize, //  The maximum number of threads to allow in the pool
        keepAliveTime, // the maximum time that excess idle threads will wait for new tasks
        timeUnit, // for the keepAliveTime argument
        workQueue, // the queue to use for holding tasks before they are executed
        threadFactory // The factory to use when the executor creates a new thread
        );
```

Producer-consumer pattern



Send a request from main thread

Control order of requests

Receive a request through channel.
Send result through Hander.

There is a trade-off between capacity and resource

**If there are many workers,
tasks are processed concurrently.
If there are too many workers,
consume memory wastefully.**

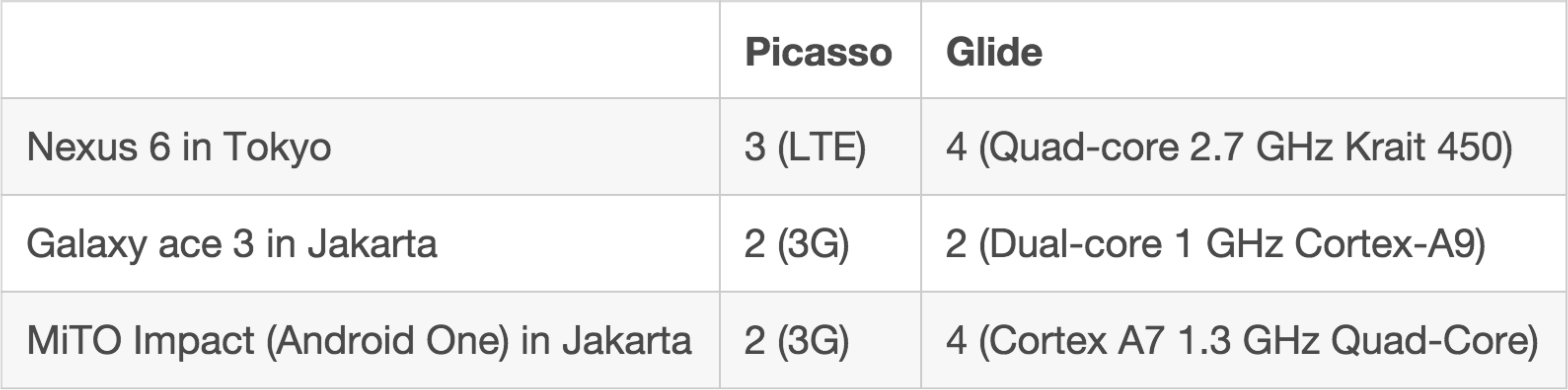
Picasso

```
switch (info.getType()) {
    case ConnectivityManager.TYPE_WIFI:
    case ConnectivityManager.TYPE_WIMAX:
    case ConnectivityManager.TYPE_ETHERNET:
        setThreadCount(4);
        break;
    case ConnectivityManager.TYPE_MOBILE:
        switch (info.getSubtype()) {
            case TelephonyManager.NETWORK_TYPE_LTE:  // 4G
            case TelephonyManager.NETWORK_TYPE_HSPAP:
            case TelephonyManager.NETWORK_TYPE_EHRPD:
                setThreadCount(3);
                break;
            case TelephonyManager.NETWORK_TYPE_UMTS: // 3G
            case TelephonyManager.NETWORK_TYPE_CDMA:
            case TelephonyManager.NETWORK_TYPE_EVDO_0:
            case TelephonyManager.NETWORK_TYPE_EVDO_A:
            case TelephonyManager.NETWORK_TYPE_EVDO_B:
                setThreadCount(2);
                break;
            case TelephonyManager.NETWORK_TYPE_GPRS: // 2G
            case TelephonyManager.NETWORK_TYPE_EDGE:
                setThreadCount(1);
                break;
```

Glide

```
Runtime.getRuntime().availableProcessors()
```

Which setting is better?

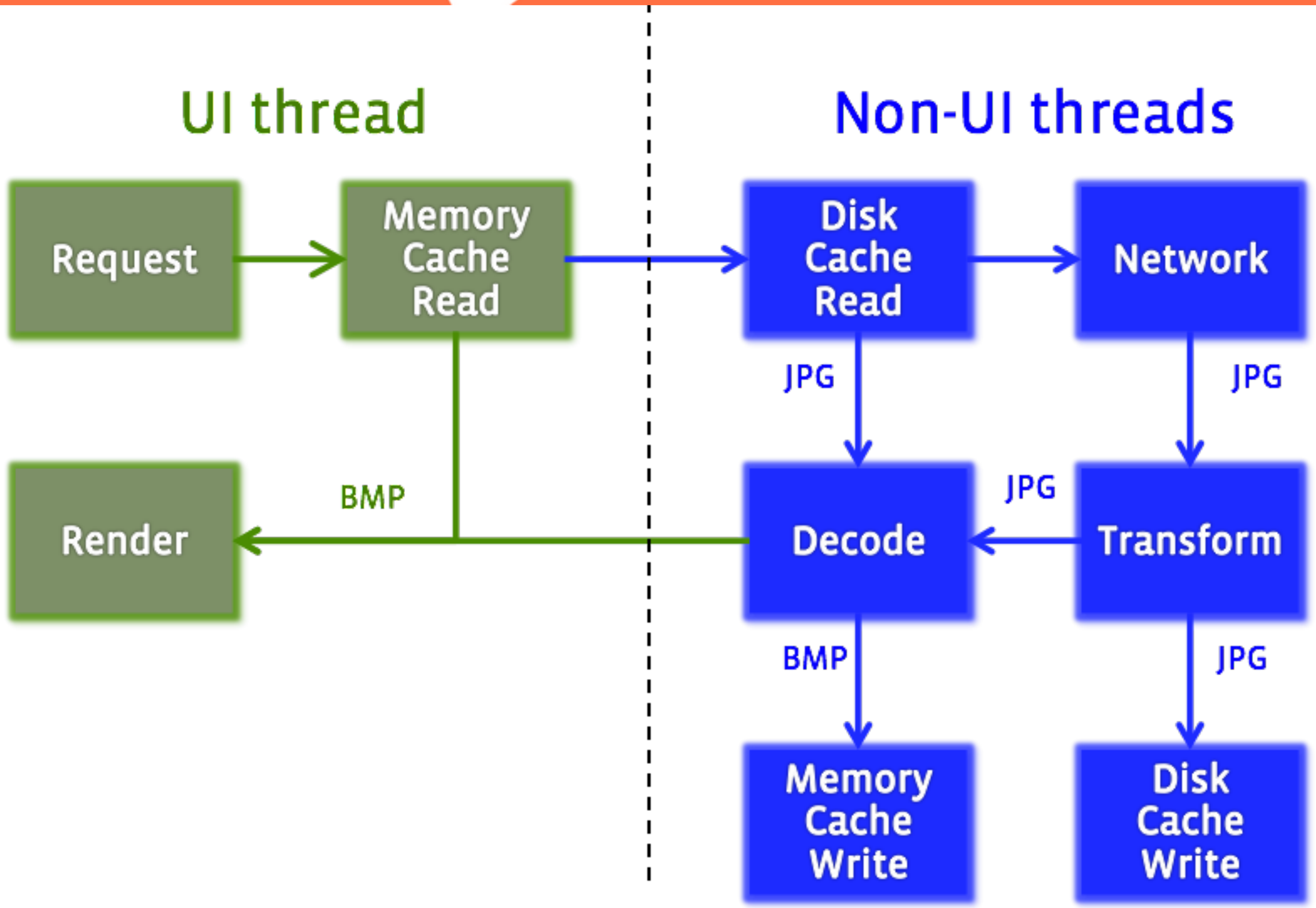


	Picasso	Glide
Nexus 6 in Tokyo	3 (LTE)	4 (Quad-core 2.7 GHz Krait 450)
Galaxy ace 3 in Jakarta	2 (3G)	2 (Dual-core 1 GHz Cortex-A9)
MiTO Impact (Android One) in Jakarta	2 (3G)	4 (Cortex A7 1.3 GHz Quad-Core)

**It is depending on network environment,
device spec, image size, transformation, …**

Fresco

A new image loading library developed by Facebook



Fresco has multiple Executors

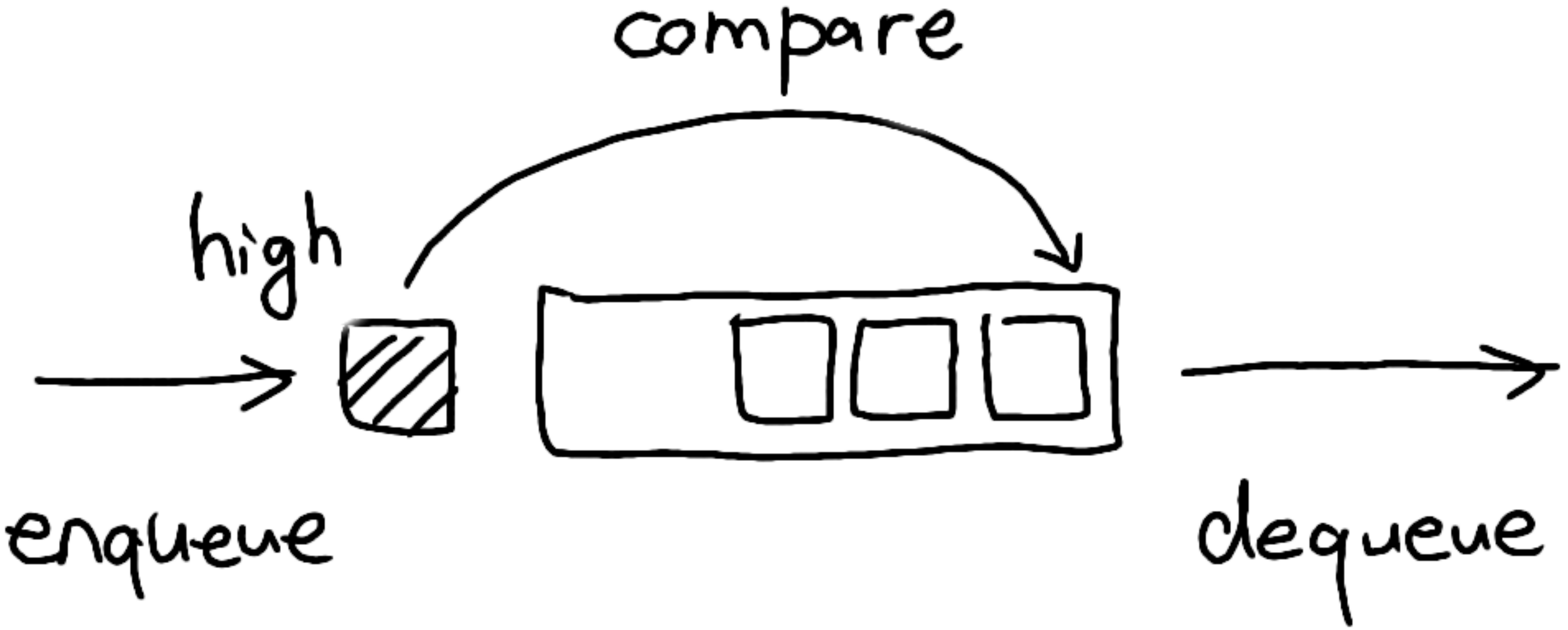
Process	Kind of Executor
forLocalStorageRead	IoBoundExecutor
forLocalStorageWrite	IoBoundExecutor
forDecode	CpuBoundExecutor
forBackground	CpuBoundExecutor

```
NUM_IO_BOUND_THREADS = 2;
NUM_CPU_BOUND_THREADS = Runtime.getRuntime().availableProcessors();
```

Queue Management

Control order of requests

PriorityBlockingQueue



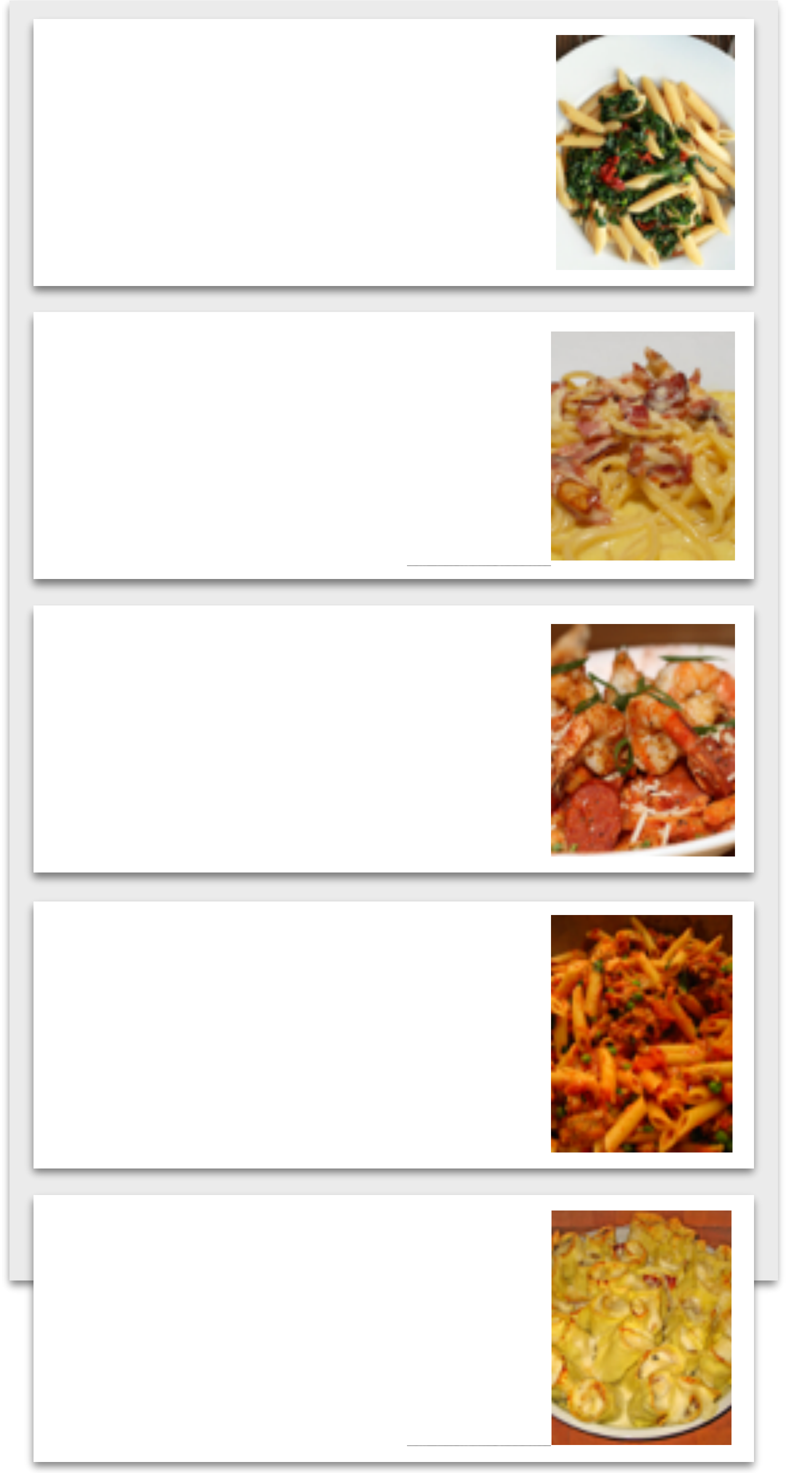
The elements order themselves according to whatever priority you decided in your Comparable implementation

We can set priority to request

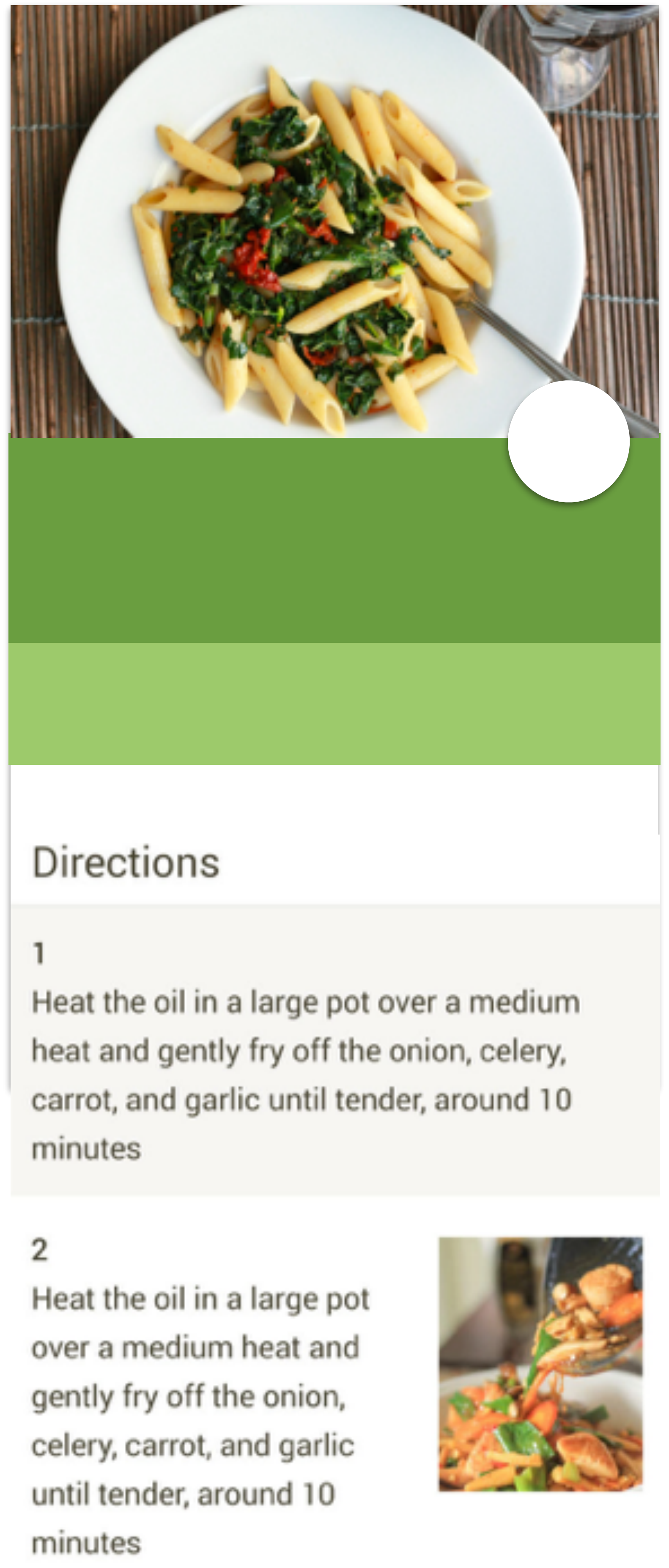
```
Picasso.with(this)
    .load(url)
    .priority(HIGH)
    .into(imageView);
```

```
Glide.with(this)
    .load(url)
    .priority(HIGH)
    .into(imageView);
```

How priority works?



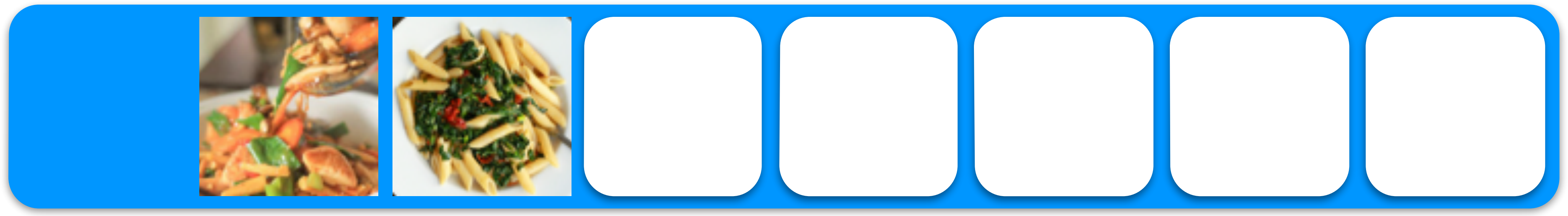
When a user open recipe detail screen,
requests are added to the end of the queue



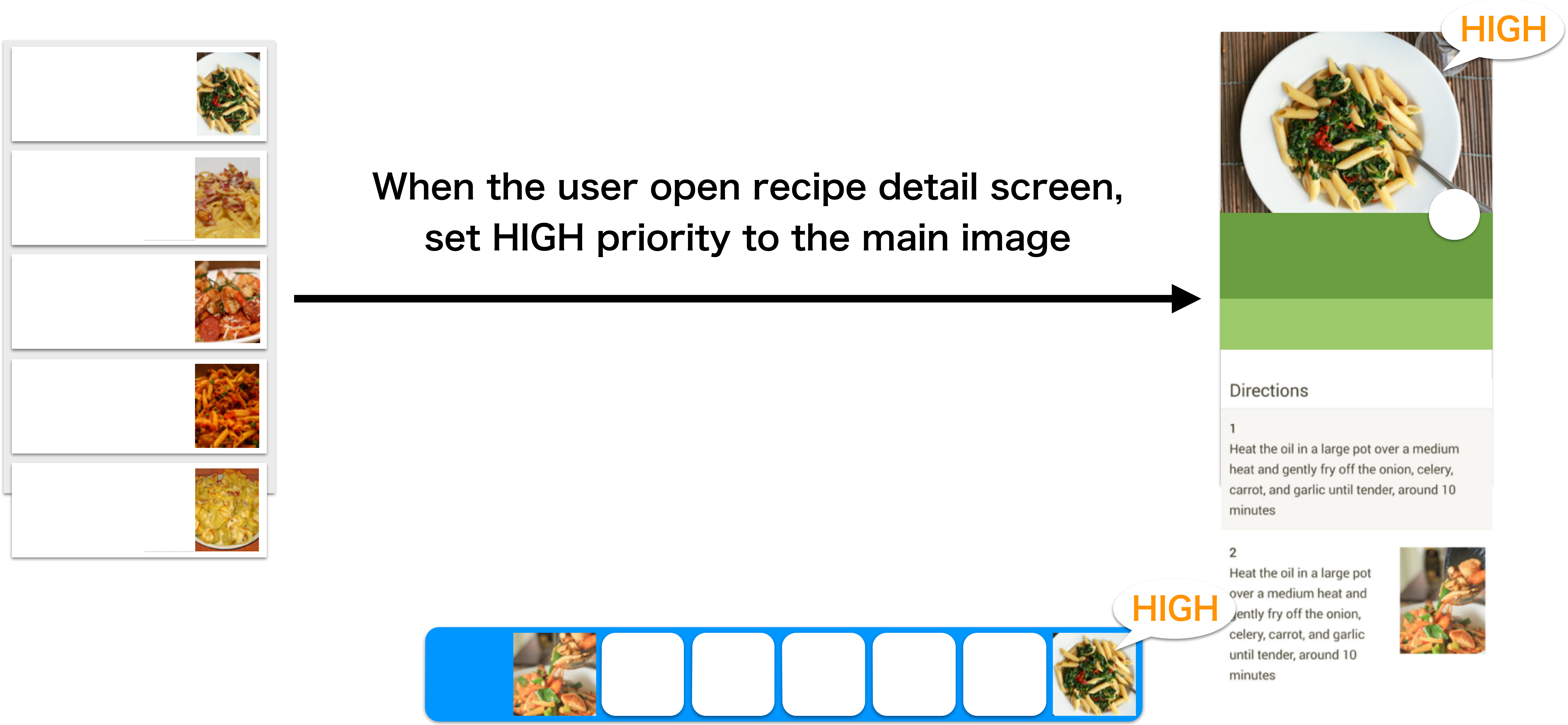
Directions

1
Heat the oil in a large pot over a medium heat and gently fry off the onion, celery, carrot, and garlic until tender, around 10 minutes

2
Heat the oil in a large pot over a medium heat and gently fry off the onion, celery, carrot, and garlic until tender, around 10 minutes



How priority works?



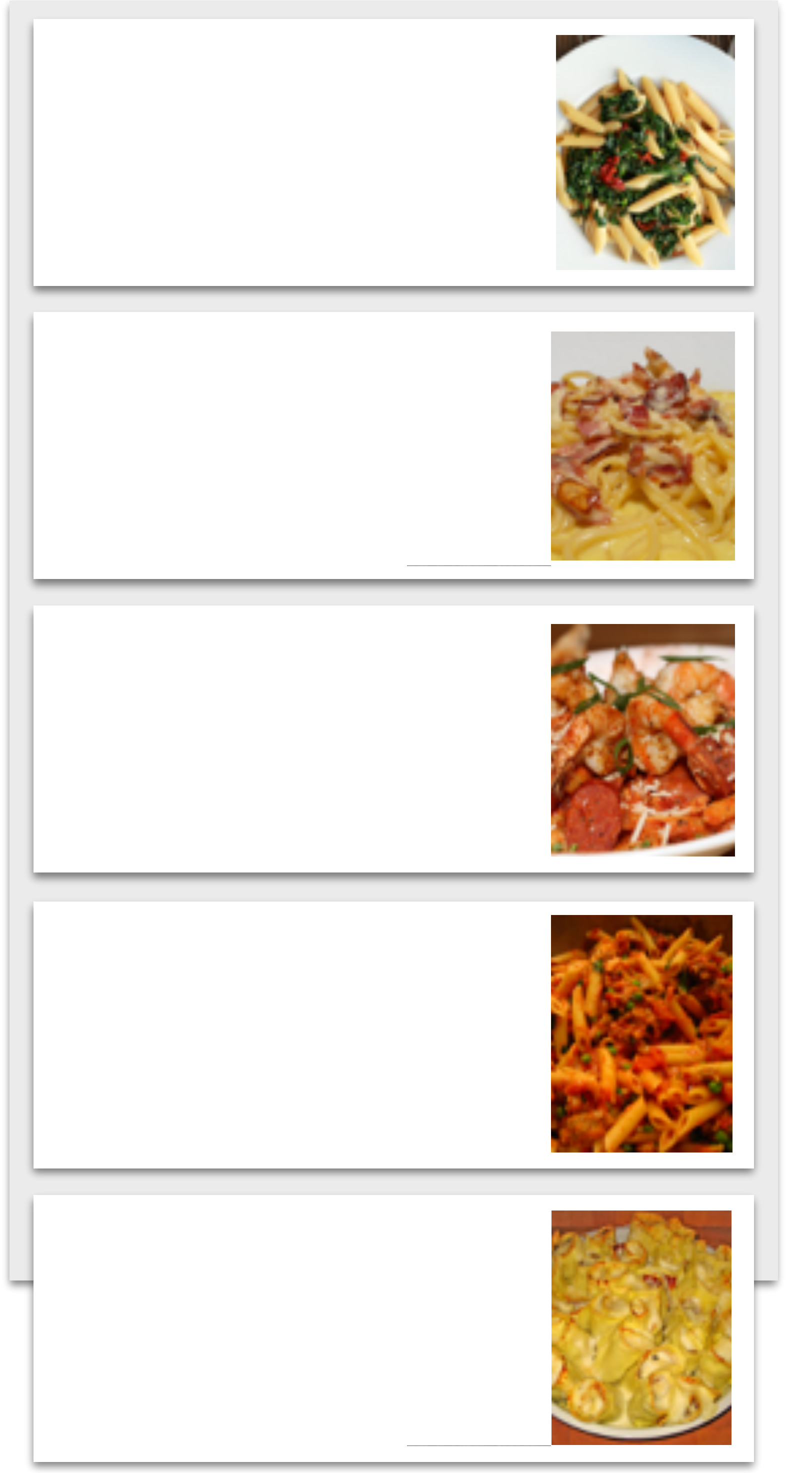
When the user open recipe detail screen,
set HIGH priority to the main image

Directions

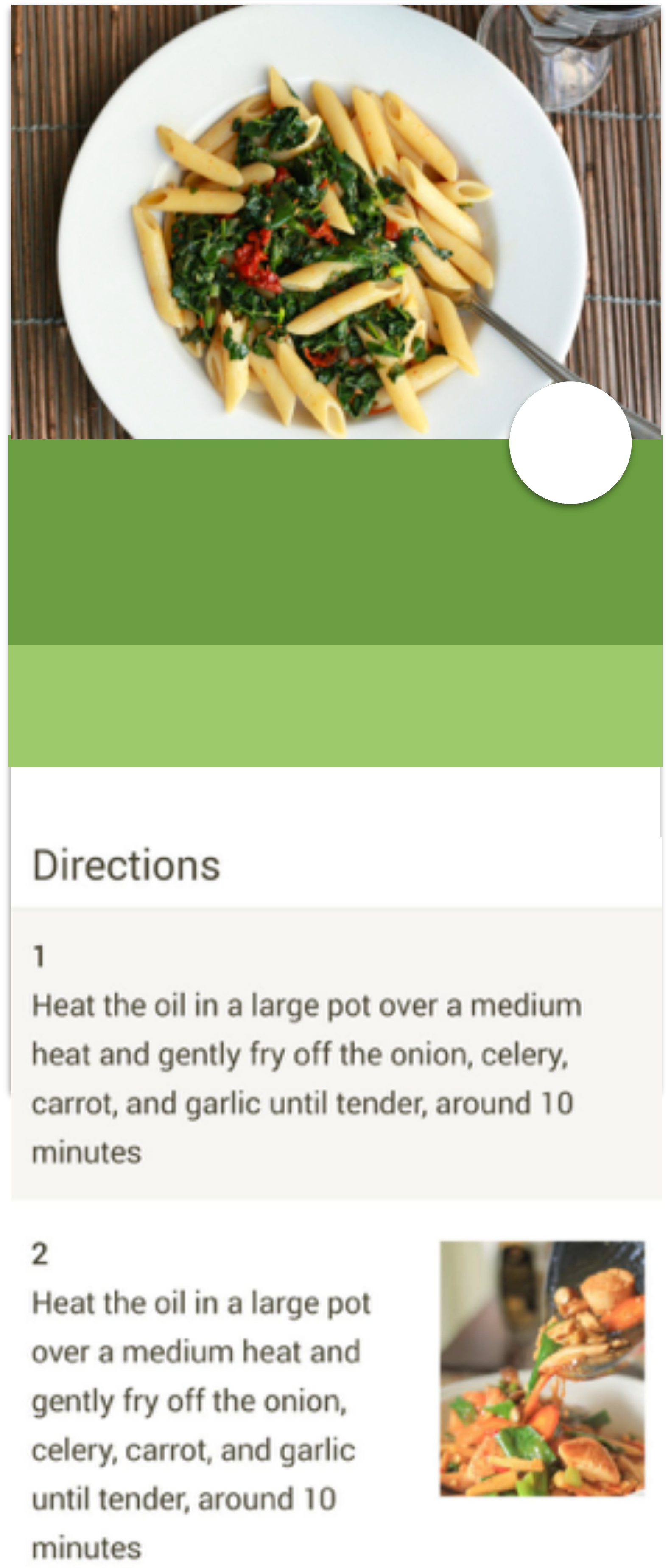
1
Heat the oil in a large pot over a medium heat and gently fry off the onion, celery, carrot, and garlic until tender, around 10 minutes

2
Heat the oil in a large pot over a medium heat and gently fry off the onion, celery, carrot, and garlic until tender, around 10 minutes

How priority works?



when the user back to recipe list screen,
call “cancelTag” to dispose useless requests



Directions

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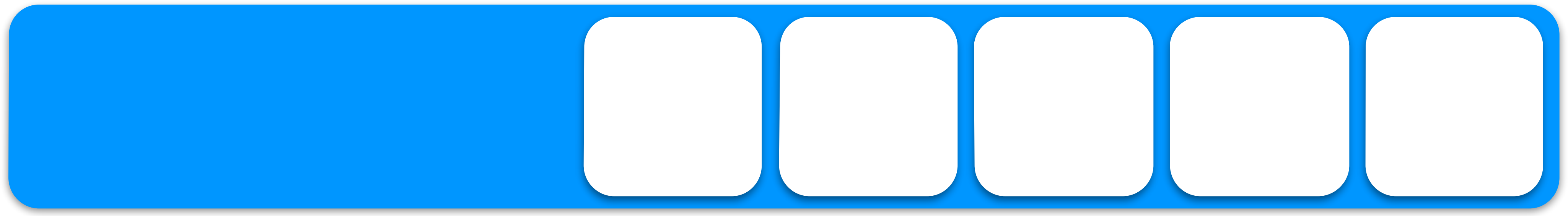
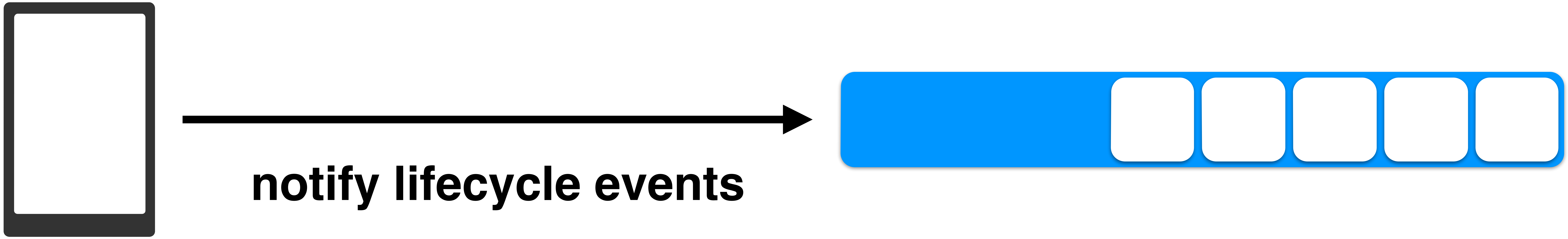
2
Heat the oil in a large pot over a medium heat and gently fry off the onion, celery, carrot, and garlic until tender, around 10 minutes

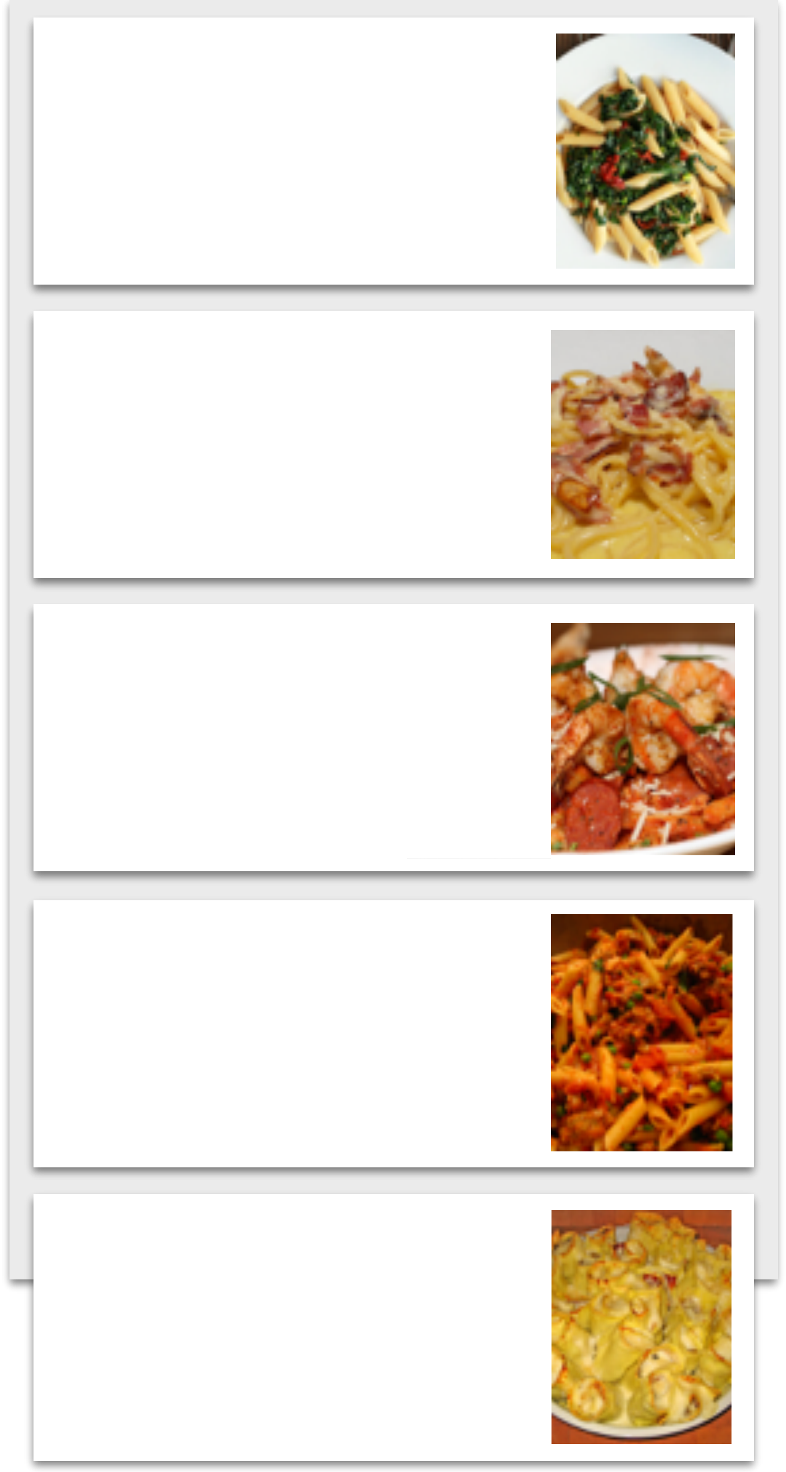


Glide has lifecycle integration

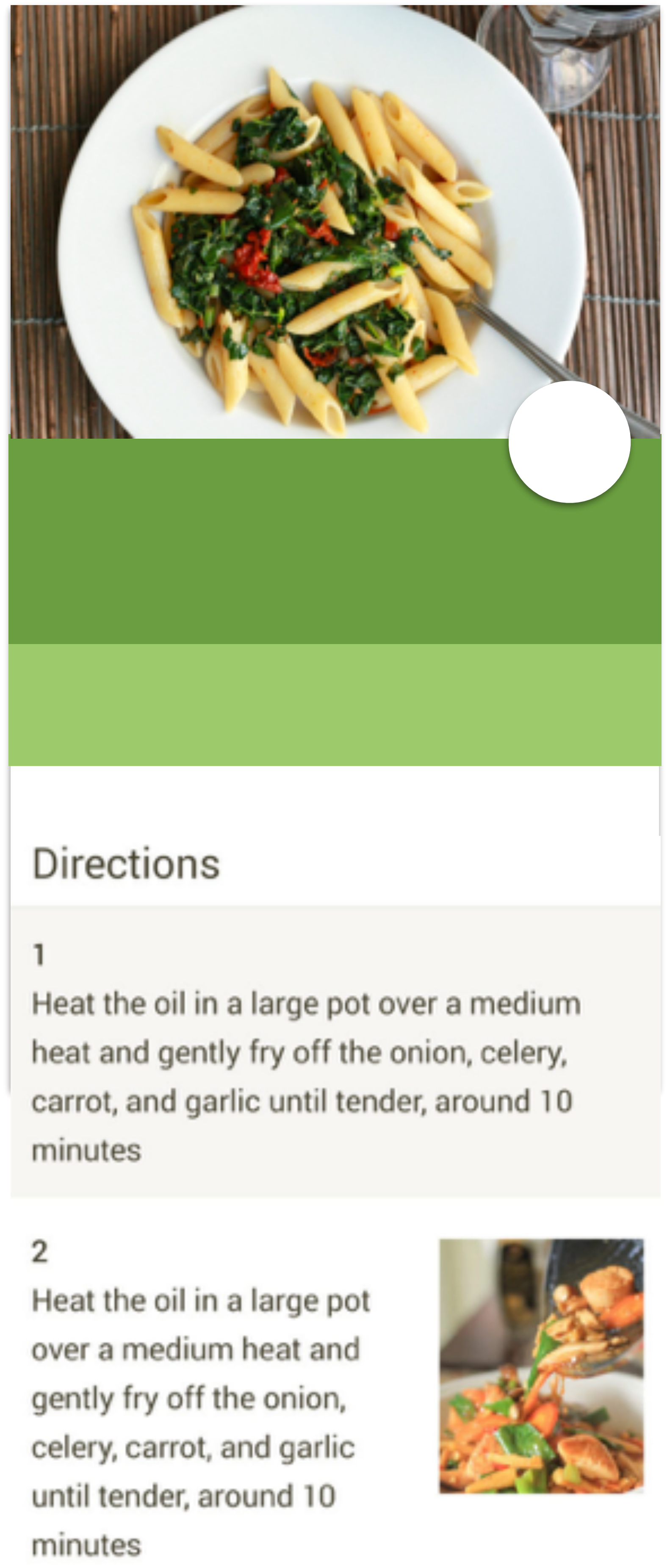


notify lifecycle events

Glide manage the queue automatically



Requests in search result screen
are paused automatically



Directions

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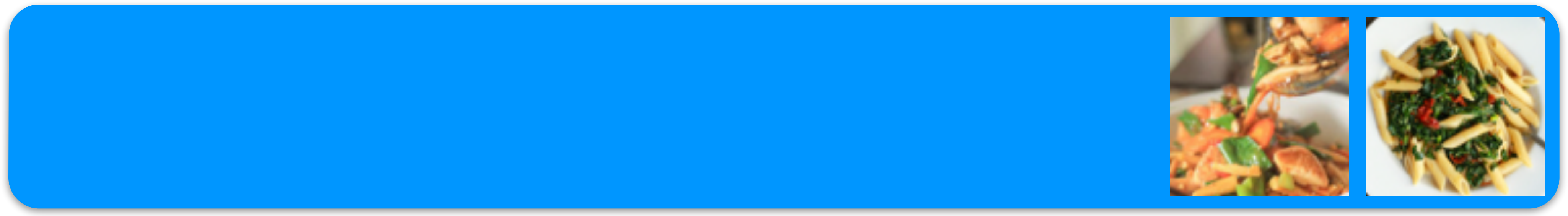
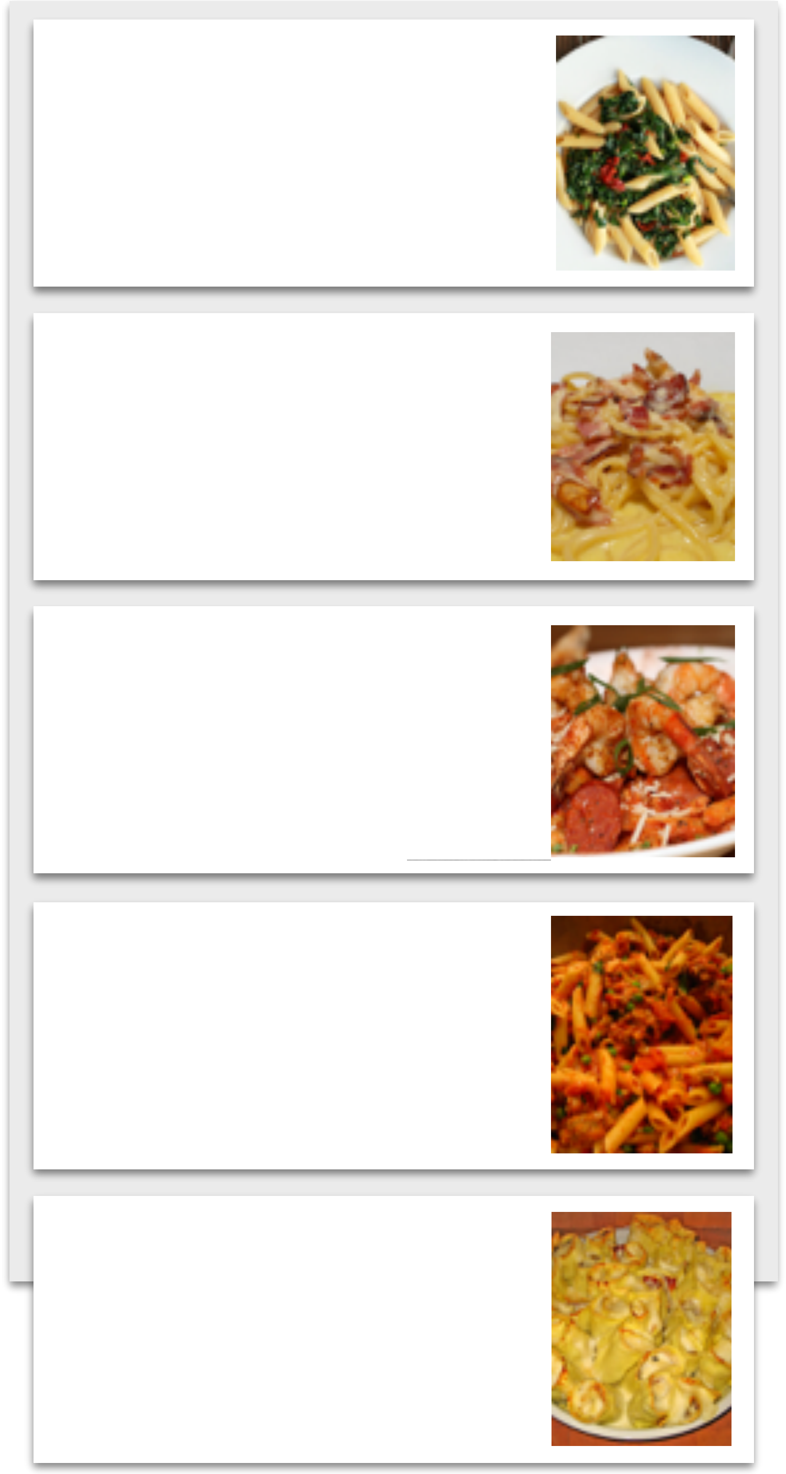
Heat the oil in a large pot over a medium heat and gently fry off the onion, celery, carrot, and garlic until tender, around 10 minutes

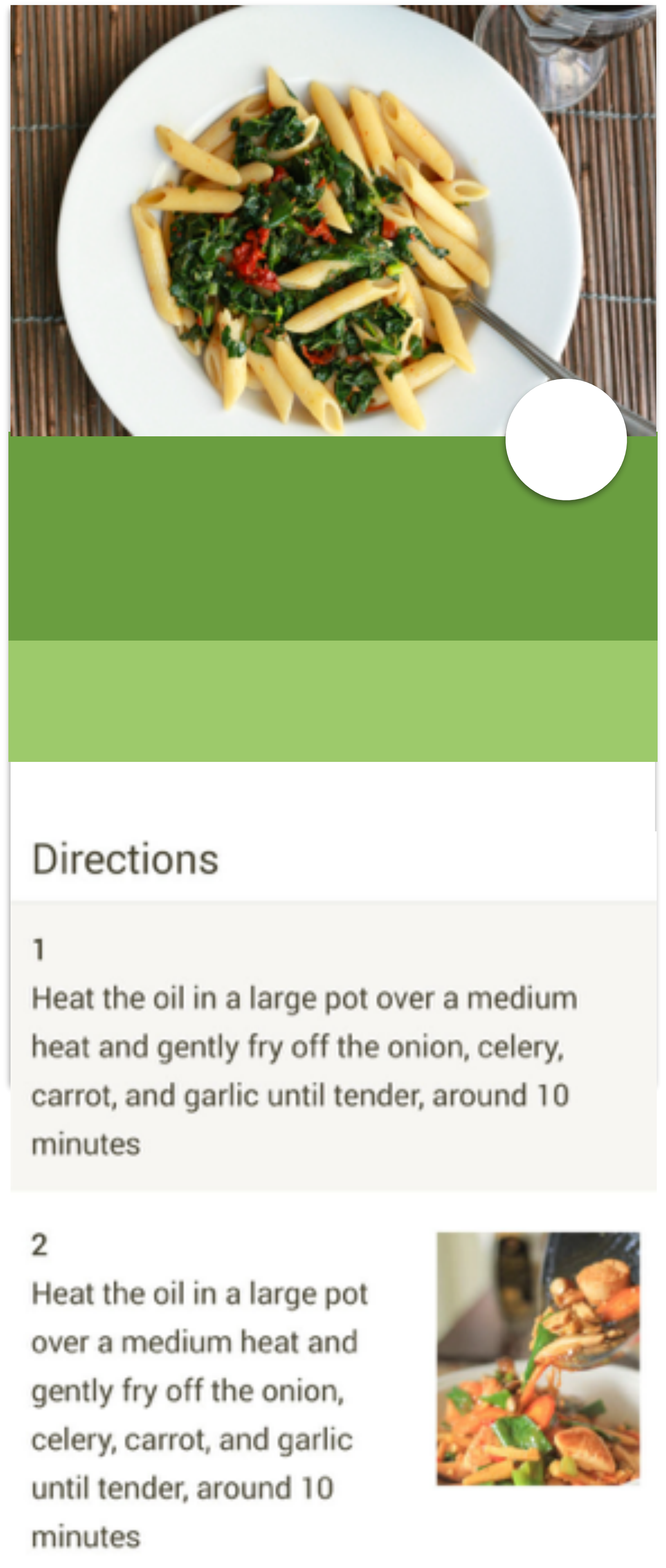


Glide manage the queue automatically



Requests in recipe detail screen
are cancelled automatically

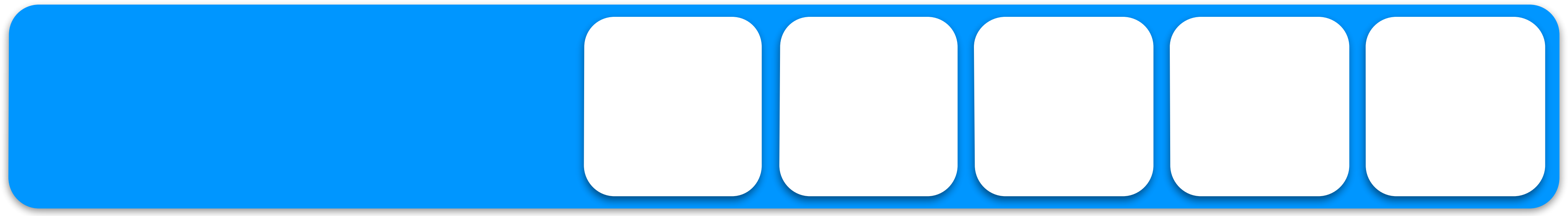
Requests in search recipe list
is restarted automatically



Directions

1
Heat the oil in a large pot over a medium heat and gently fry off the onion, celery, carrot, and garlic until tender, around 10 minutes

2
Heat the oil in a large pot over a medium heat and gently fry off the onion, celery, carrot, and garlic until tender, around 10 minutes



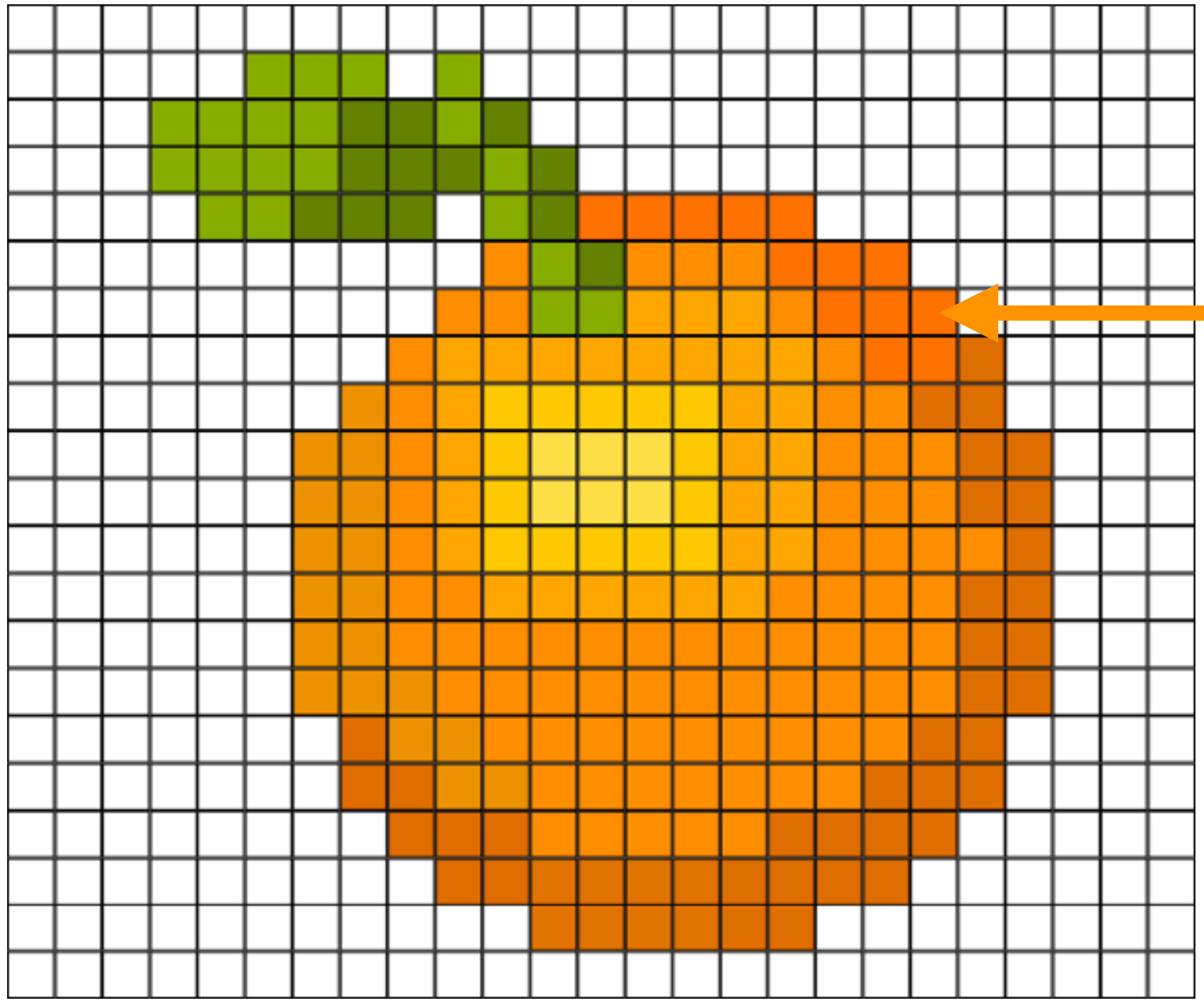
Notice:

Glide adds view-less fragment to each Activity to observe lifecycle events.

Bitmap Pool

Reuse memory when new Bitmap is requested

Memory management for Bitmap



FFFD7222

Each pixel takes up 4 bytes

25 px * 21 px * 4 byte = 2,400 byte

Glide has Bitmap Pool

reuse resources to avoid unnecessary allocations

Request a Bitmap

width, height, config

Bitmap

4.4+: SizeStrategy

<4.4: AttributeStrategy

Develop
Training
Managing Bitmap Memory

Managing Bitmap Memory

Manage Memory on Android 3.0 and Higher

Android 3.0 (API level 11) introduces the BitmapFactory.Options.inBitmap field. If this option is set, decode methods that take the Options object will attempt to reuse an existing bitmap when loading content. This means that the bitmap's memory is reused, resulting in improved performance, and removing both memory allocation and de-allocation. However, there are certain restrictions with how inBitmap can be used. In particular, before Android 4.4 (API level 19), only equal sized bitmaps are supported. For details, please see the inBitmap documentation.

4.4+: SizeStrategy

<4.4: AttributeStrategy

Image Format

We are using WebP that is an image format developed by Google

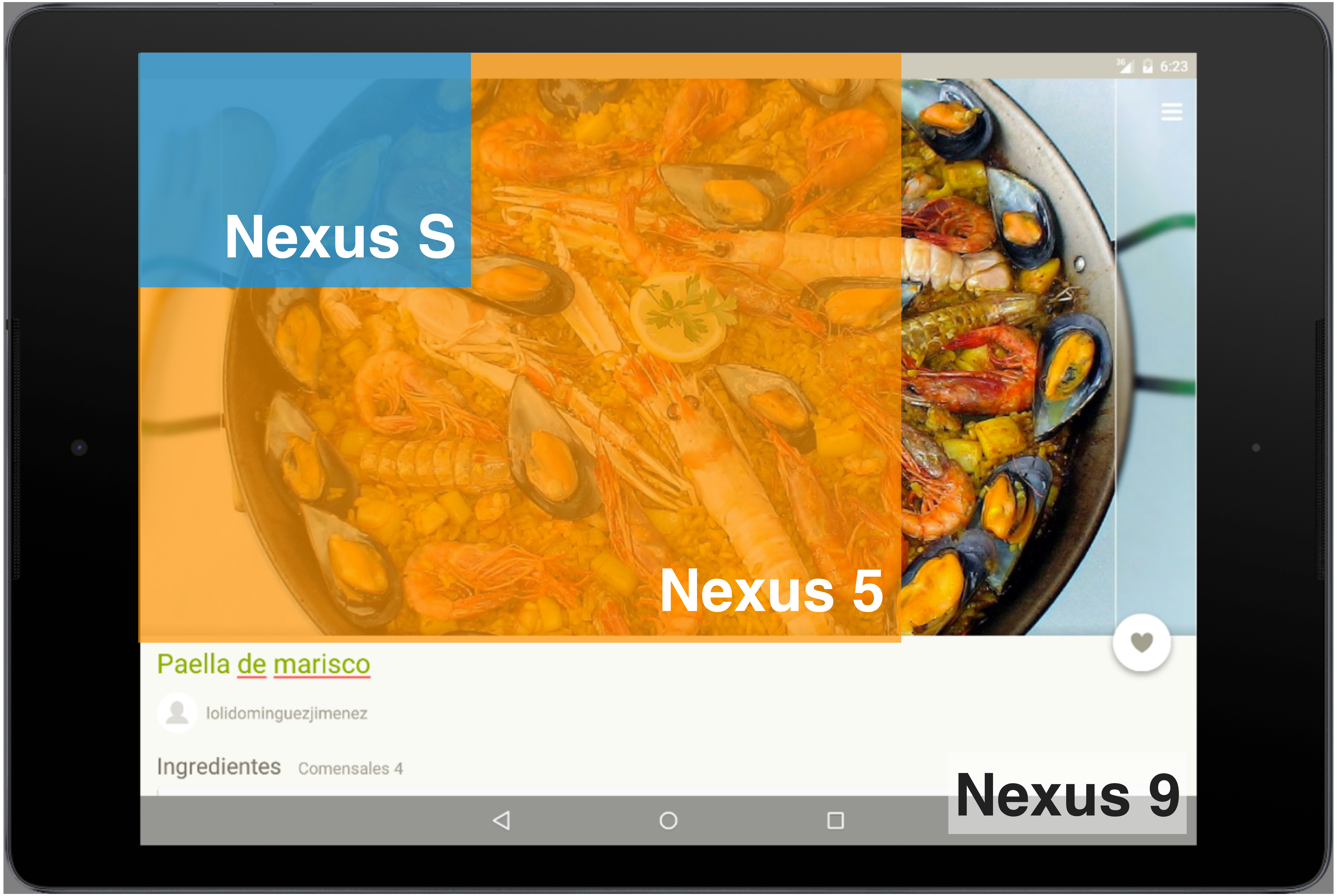
WebP lossless images are 26% smaller in size compared to PNGs
WebP lossy images are 25-34% smaller in size compared to JPEGs

Comparison of image size

90,602 bytes
51,288 bytes
30,214 bytes
23,550 bytes
20,882 bytes
18,344 bytes
74%
jpeg
webp (q = 90)
webp (q = 80)
webp (q = 70)
webp (q = 60)
webp (q = 50)

Image Size

Request an appropriate image size



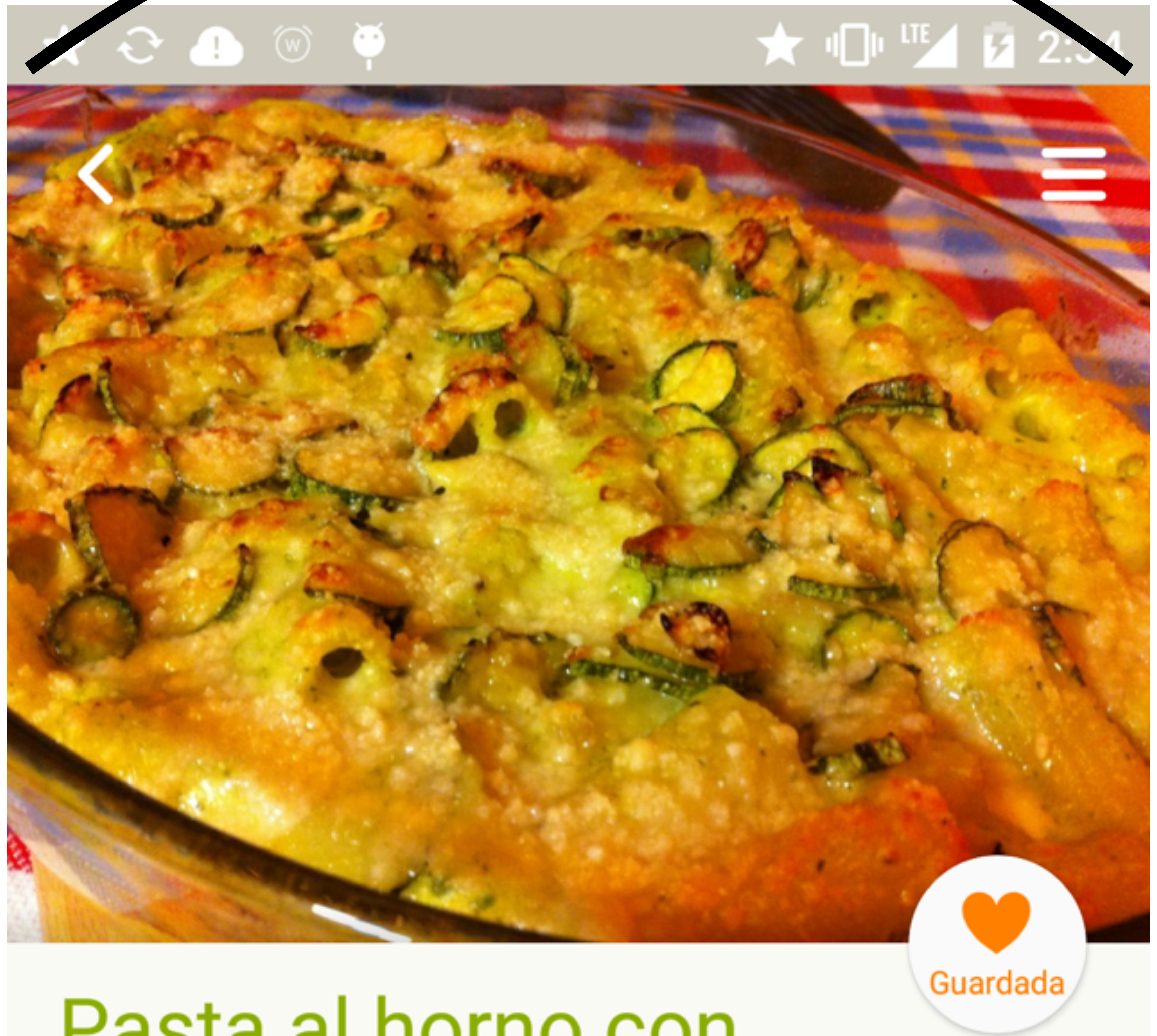
Paella de marisco

lolidominguezjimenez

Ingredientes Comensales 4

http://.../1080x756/photo.webp

target.getWidth() => 1080



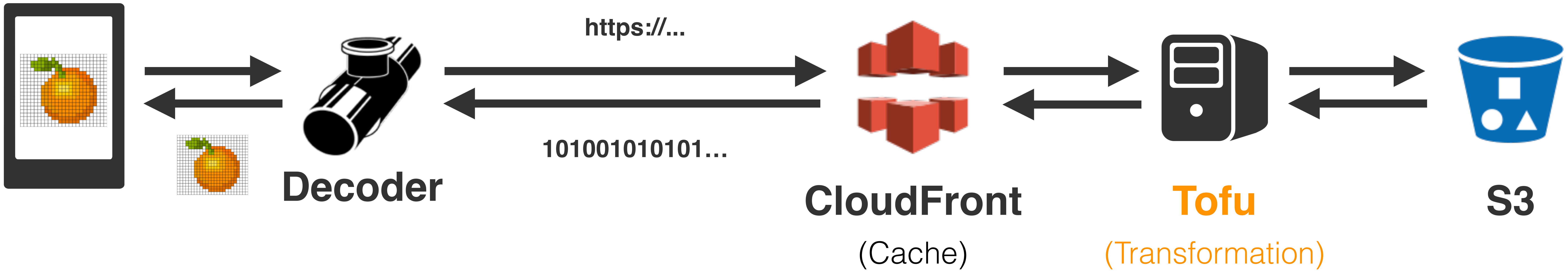
Pasta al horno con

target.getHeight() => 756

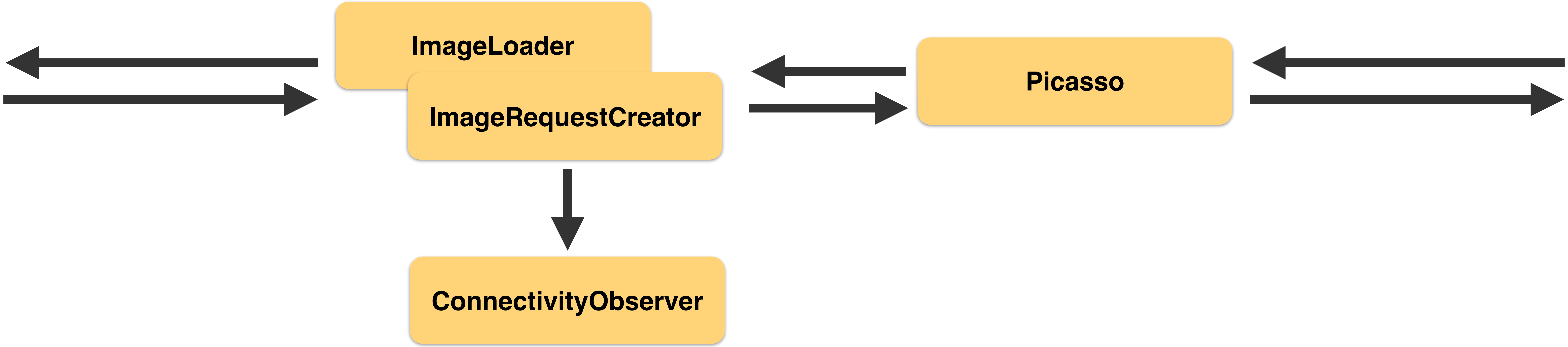
We are using image transformation server called Tofu.
Tofu transforms images on the fly.

Tofu has these functions

- Fixed Width: (\d+)
- Fixed Height: x(\d+)
- Fixed Width and Height: (\d+)x(\d+)
- Smaller than: (\d+)?(x\d+)?s
- Cropping: (\d+)x(\d+)c
- Manual Cropping: (\d+)x(\d+)c(\d+)_(\d+)_(\d+)_(\d+)_(\d+)
- Quality Factor: [geometry]q(\d+)
- …

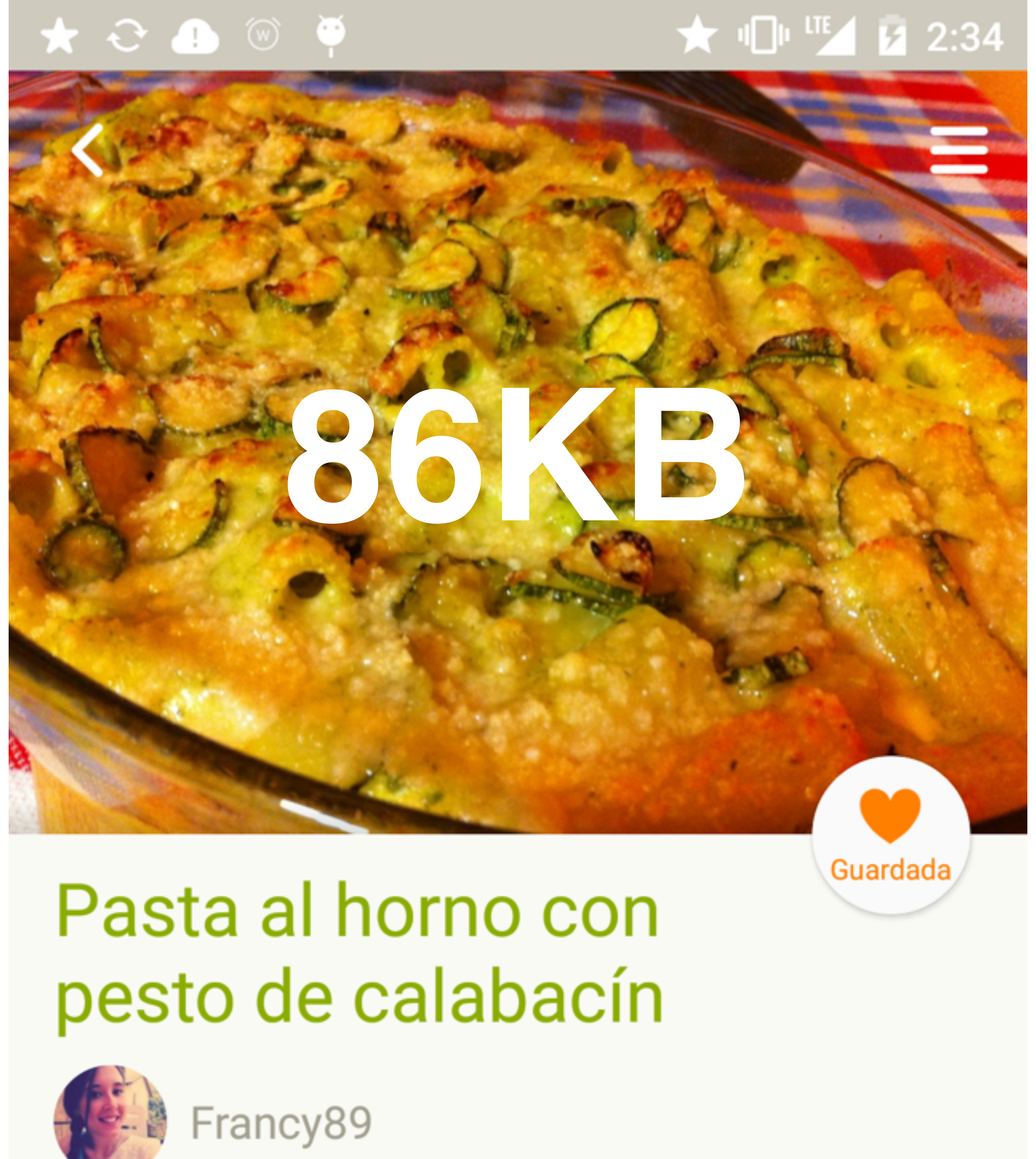


Request different image size depends on network quality



LOW images are 40% smaller than full images

EXCELLENT: (1080 * 756) * 1.0



2:34

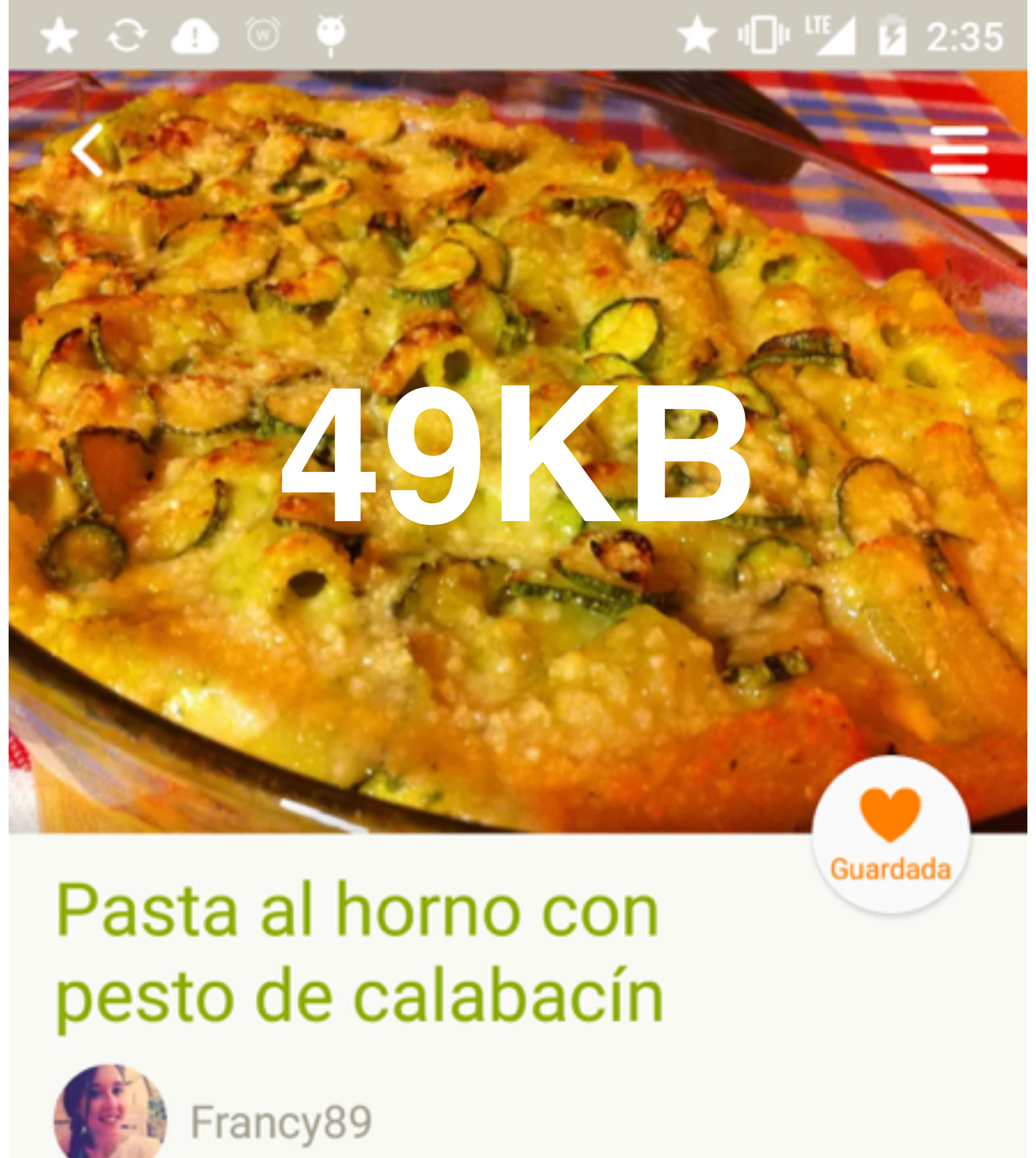
86KB

Guardada

Pasta al horno con pesto de calabacín

Francy89

LOW: (756 * 530) * 0.7



2:35

49KB

Guardada

Pasta al horno con pesto de calabacín

Francy89

API Design

**If API responses become faster,
users become happier.** **?**

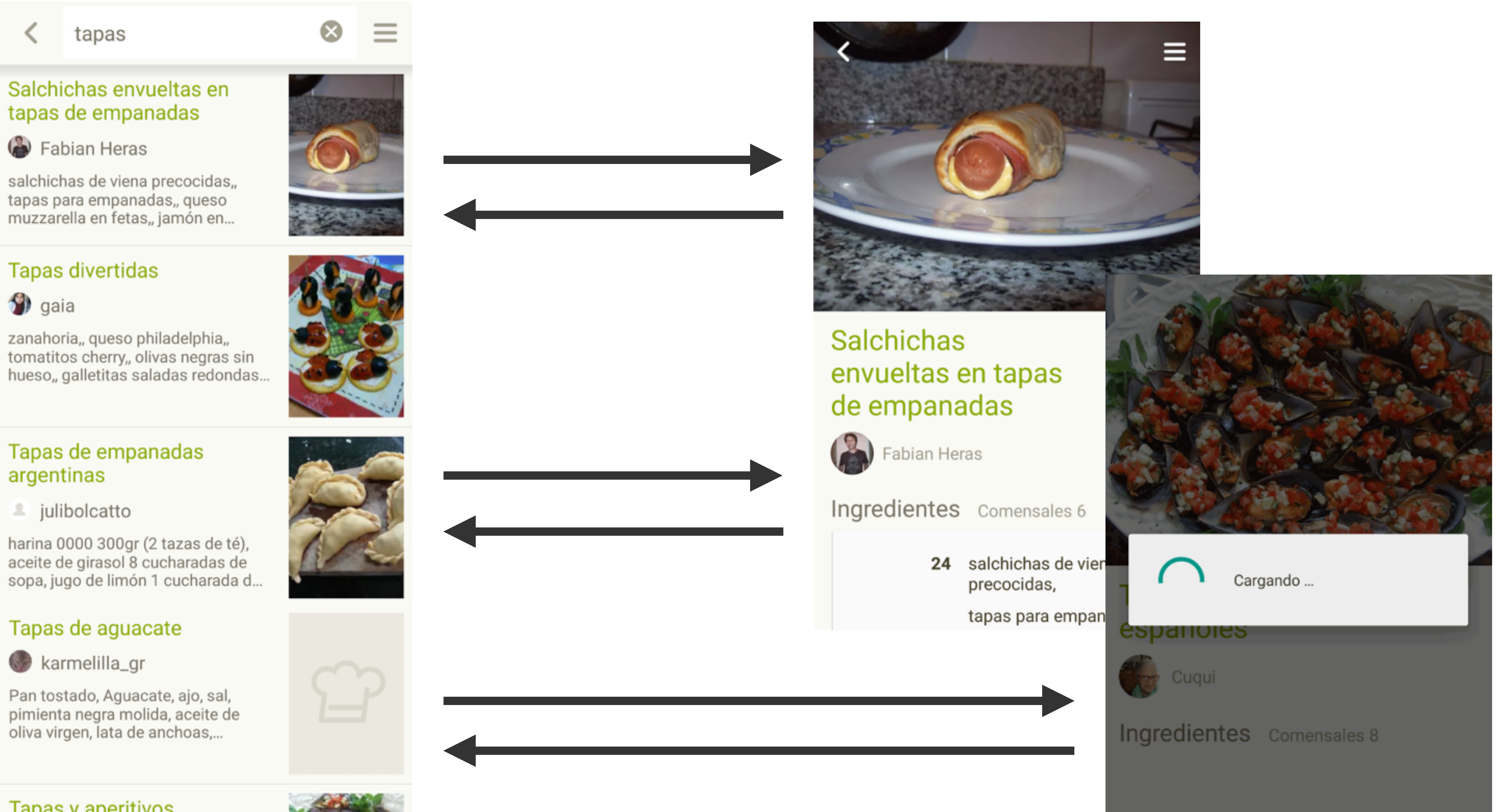
Of course, the answer is

“Yes”

Let’s use partial response to reduce data size

**But be careful,
Android has state and
screen transition**

Users go back and forth to decide a recipe



tapas

Salchichas envueltas en tapas de empanadas

Fabian Heras

salchichas de viena precocidas,, tapas para empanadas,, queso muzzarella en fetas,, jamón en...

Tapas divertidas

gaia

zanahoria,, queso philadelphia,, tomatitos cherry,, olivas negras sin hueso,, galletitas saladas redondas...

Tapas de empanadas argentinas

julibolcatto

harina 0000 300gr (2 tazas de té), aceite de girasol 8 cucharadas de sopa, jugo de limón 1 cucharada d...

Tapas de aguacate

karmelilla_gr

Pan tostado, Aguacate, ajo, sal, pimienta negra molida, aceite de oliva virgen, lata de anchoas,...

Tapas y aperitivos

Salchichas envueltas en tapas de empanadas

Fabian Heras

Ingredientes Comensales 6

24 salchichas de vier precocidas,

tapas para empan

Cargando ...

españoles

Cuqui

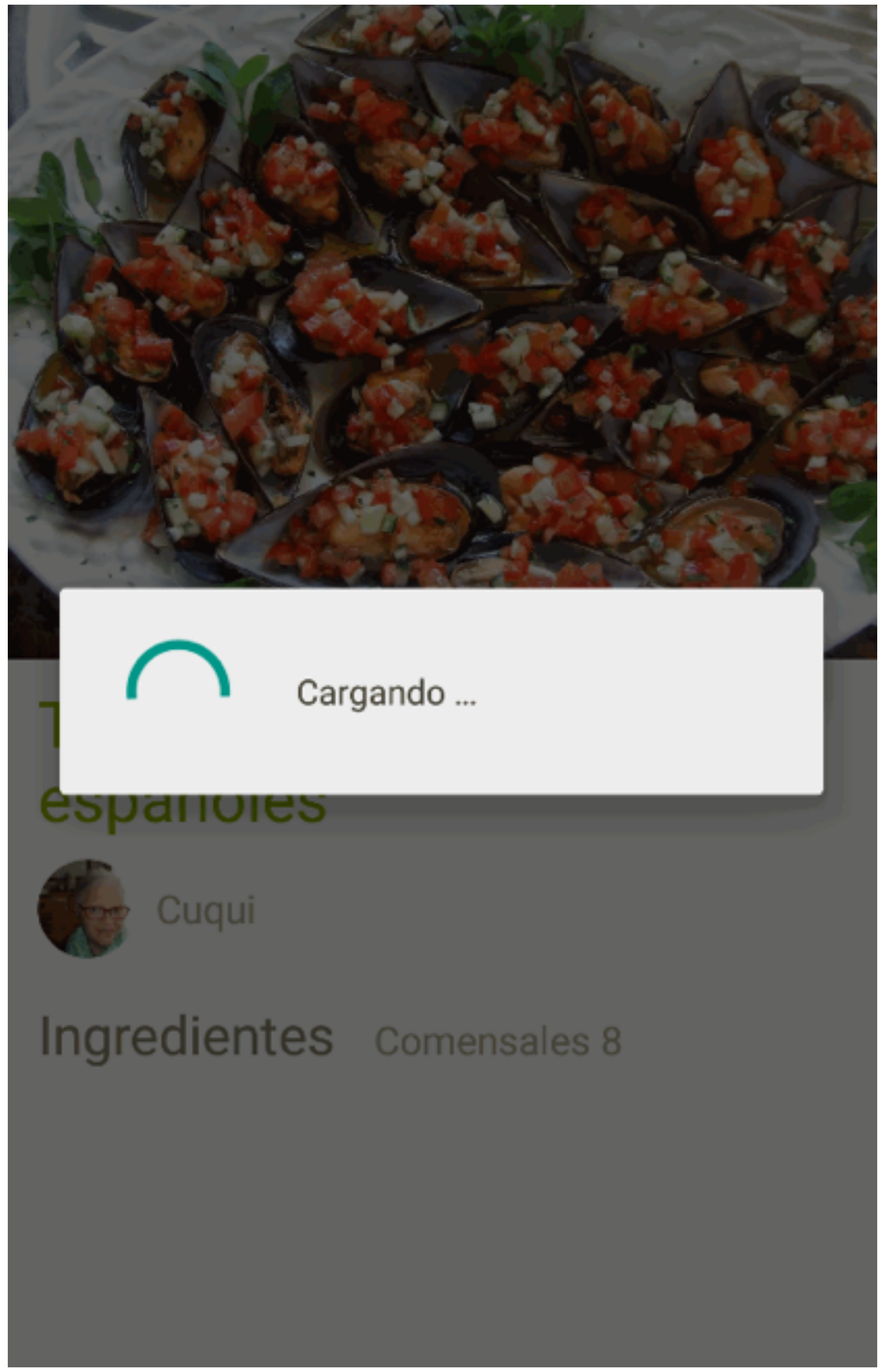
Ingredientes Comensales 8

Thing we have to do is Optimizing UX > response time

200 ms or below
10,000 ms
...

Distance between phone and server is very very very … long
Particularly in emerging markets

Reduce unnecessary fields
Get necessary relations



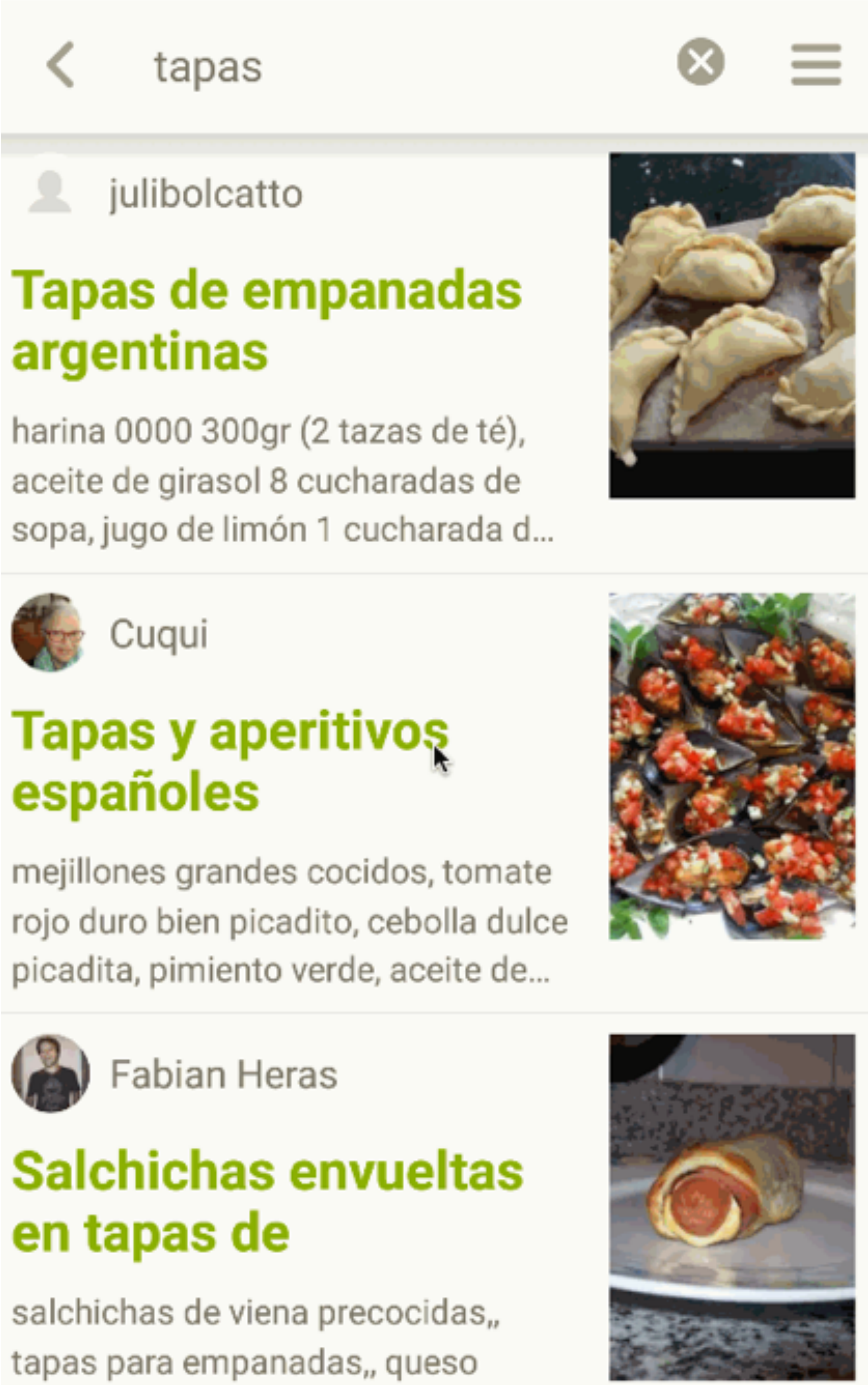
Cargando ...

T
españoles

Cuqui

Ingredientes Comensales 8

Bad



tapas

julibolcatto

Tapas de empanadas argentinas

harina 0000 300gr (2 tazas de té), aceite de girasol 8 cucharadas de sopa, jugo de limón 1 cucharada d...

Cuqui

Tapas y aperitivos españoles

mejillones grandes cocidos, tomate rojo duro bien picadito, cebolla dulce picadita, pimiento verde, aceite de...

Fabian Heras

Salchichas envueltas en tapas de

salchichas de viena precocidas,, tapas para empanadas,, queso

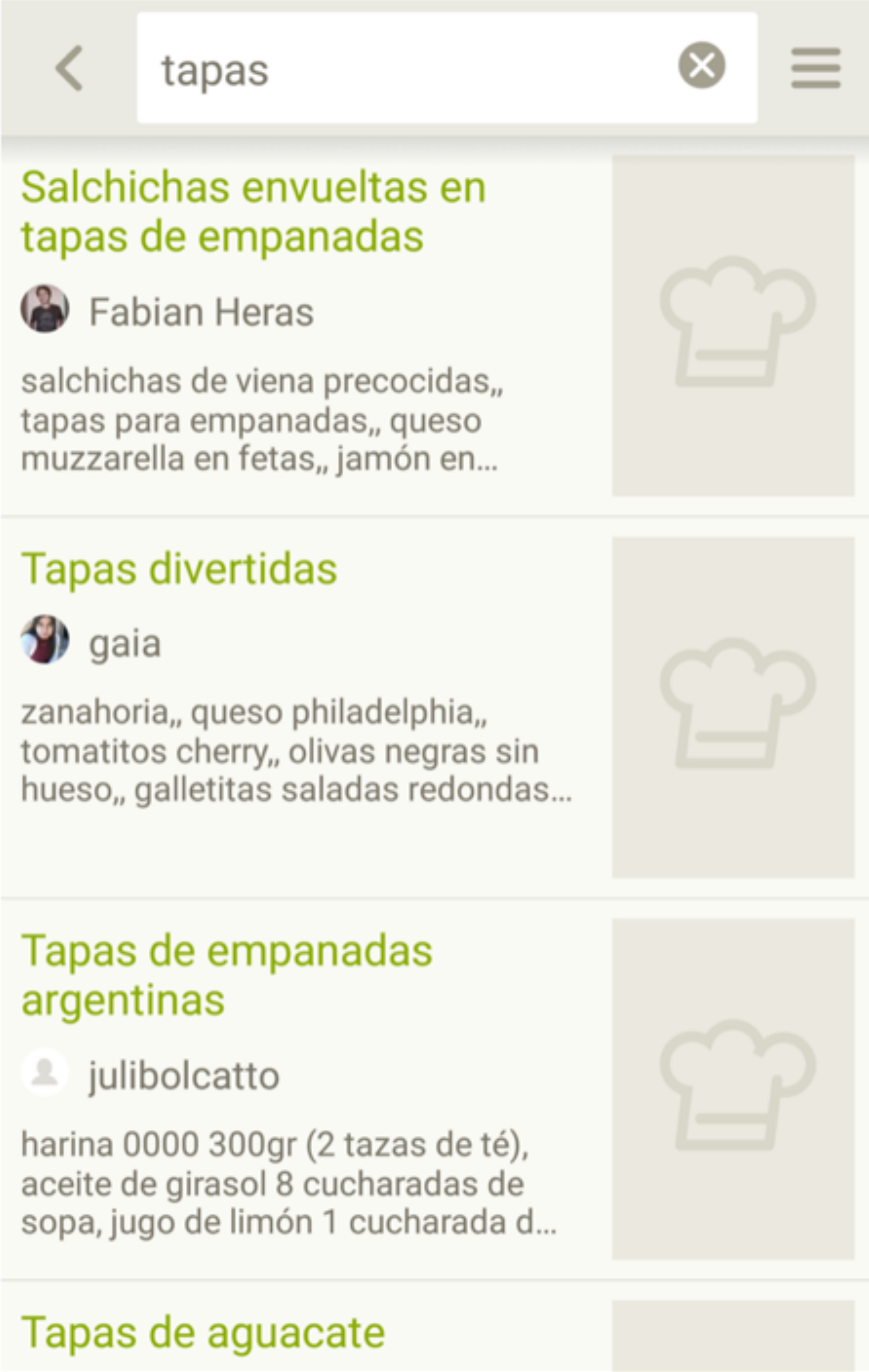
GOOD

One more thing
to improve experience

Response include thumbnail_data_uri
Base64 encoded image

```
{
    “id":1,
    "title":"Penne with Spring Vegetables”,
    “thumbnail_data_uri": “data:image/jpeg;base64,/9j/4AAQSkZJRg…”,
    “description”: “…”
}
```

Data size is small but there is a big improvement



tapas

Salchichas envueltas en tapas de empanadas

Fabian Heras

salchichas de viena precocidas,, tapas para empanadas,, queso muzzarella en fetas,, jamón en...

Tapas divertidas

gaia

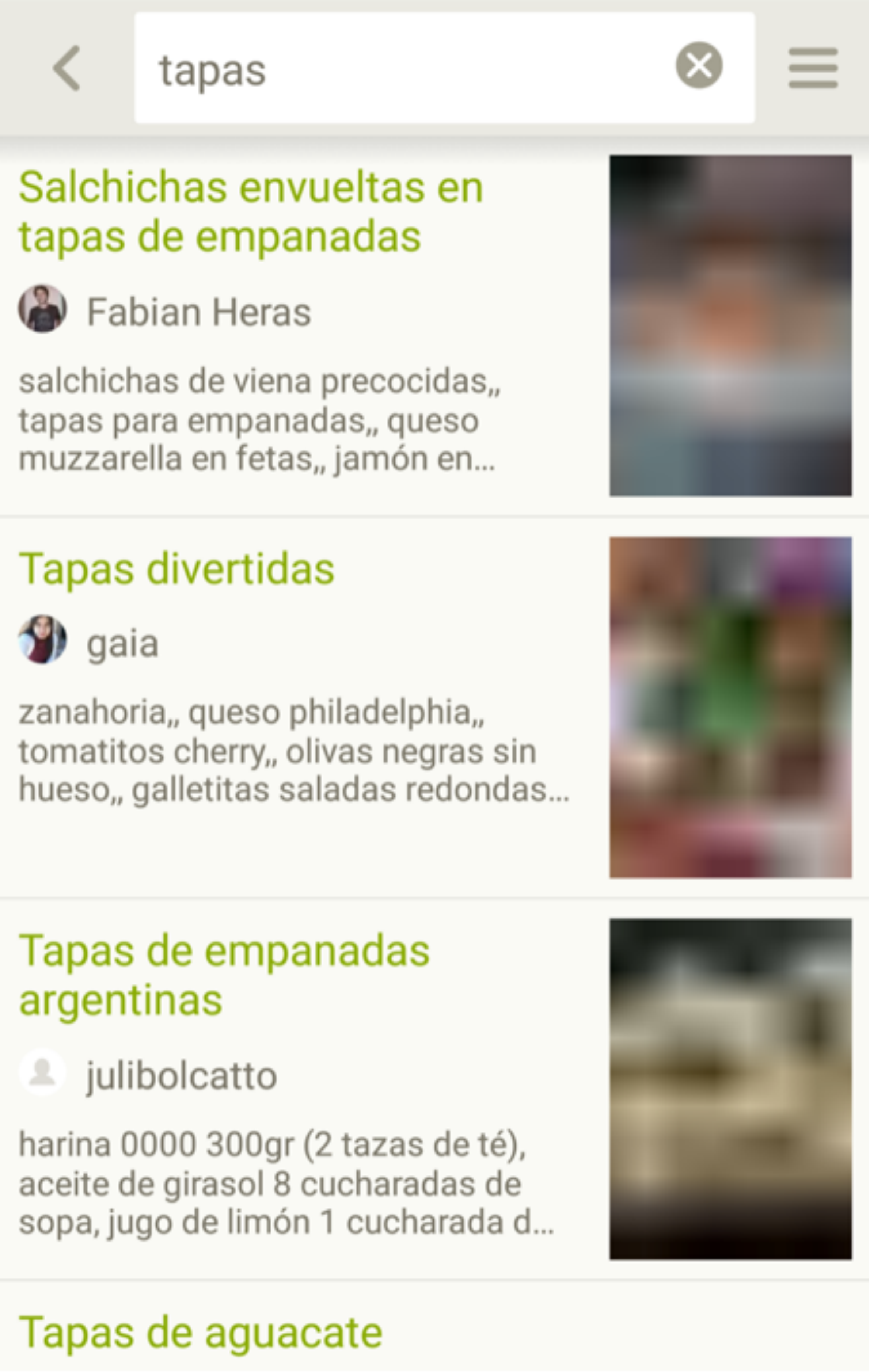
zanahoria,, queso philadelphia,, tomatitos cherry,, olivas negras sin hueso,, galletitas saladas redondas...

Tapas de empanadas argentinas

julibolcatto

harina 0000 300gr (2 tazas de té), aceite de girasol 8 cucharadas de sopa, jugo de limón 1 cucharada d...

Tapas de aguacate



tapas

Salchichas envueltas en tapas de empanadas

Fabian Heras

salchichas de viena precocidas,, tapas para empanadas,, queso muzzarella en fetas,, jamón en...

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Tapas de empanadas argentinas

julibolcatto

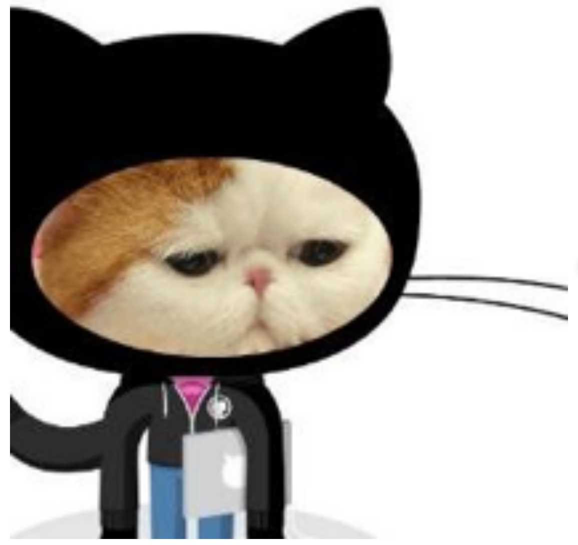
harina 0000 300gr (2 tazas de té), aceite de girasol 8 cucharadas de sopa, jugo de limón 1 cucharada d...

Tapas de aguacate

Documentation

Keeping the documentation updated in real time is hard

We are working on separated timezone



Hi, can I ask you a question about API?

...

Today

Sorry for late reply

We are using

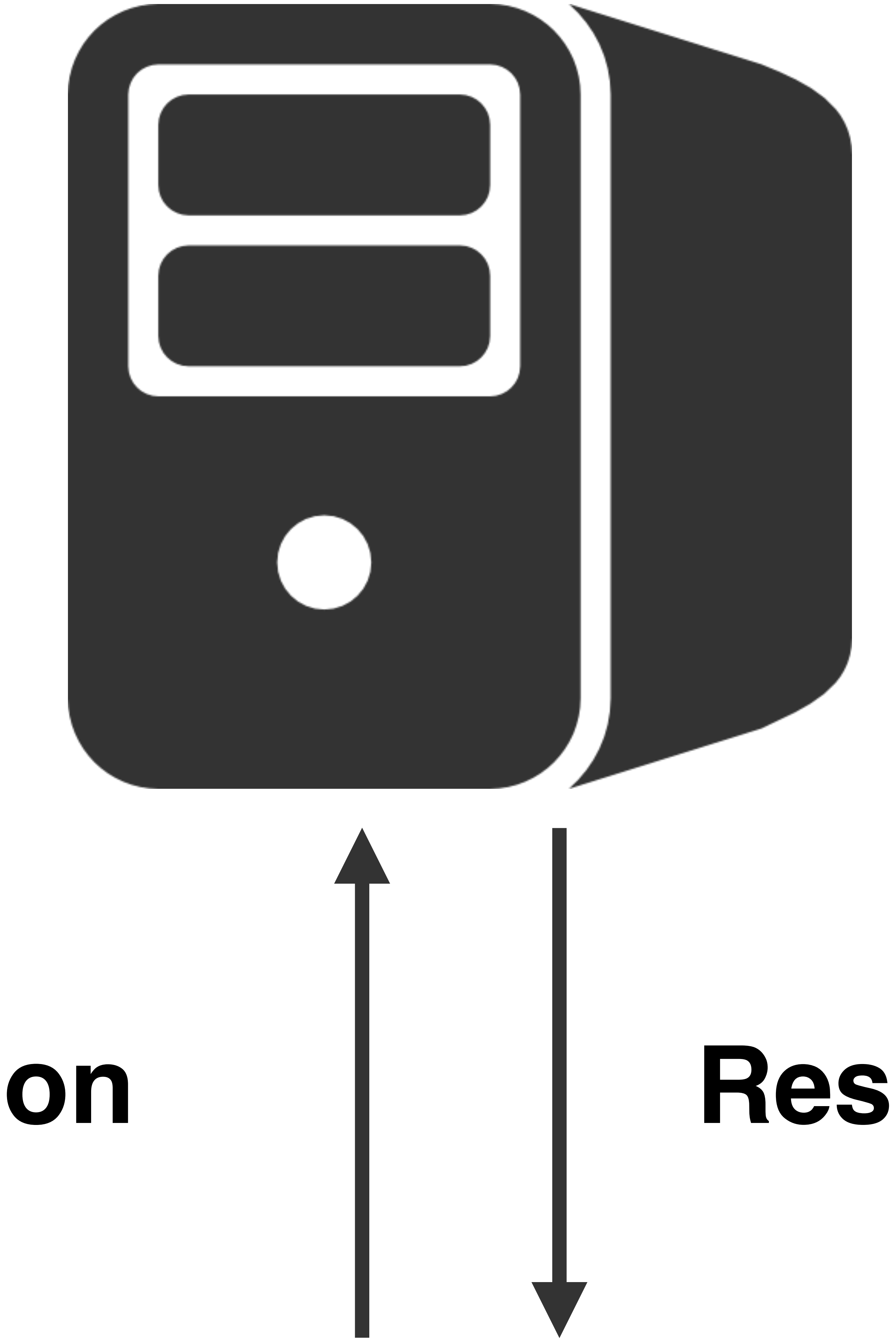
JSON Schema

as the format for describing our APIs

JSON Schema provides

- Request Validation
- Response Validation
- Document generation

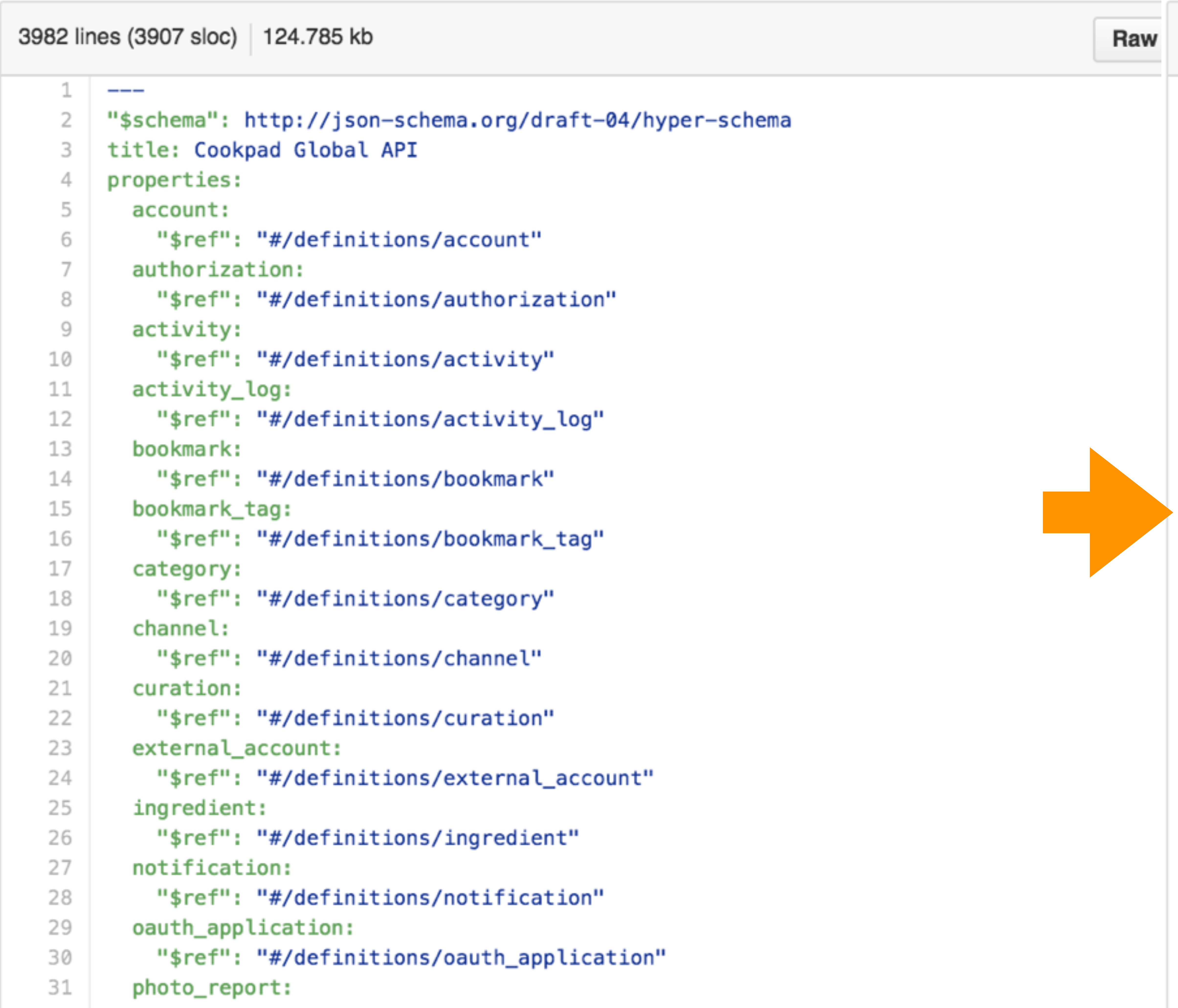
Check request/response automatically



RequestValidation

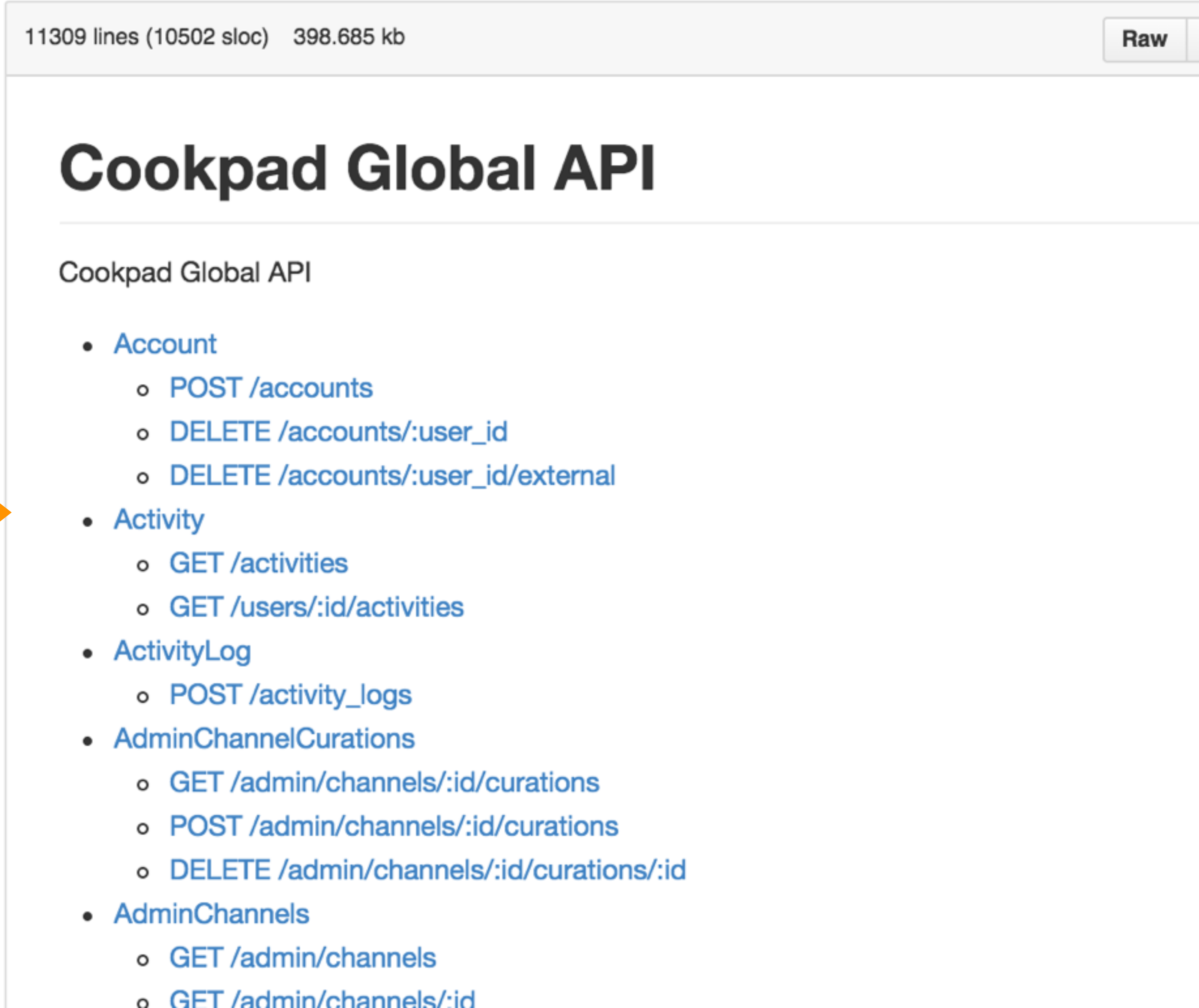
ResponseValidation

Generate API documentation from schema file



3982 lines (3907 sloc) | 124.785 kb

```yaml
---
"$schema": http://json-schema.org/draft-04/hyper-schema
title: Cookpad Global API
properties:
  account:
    "$ref": "#/definitions/account"
  authorization:
    "$ref": "#/definitions/authorization"
  activity:
    "$ref": "#/definitions/activity"
  activity_log:
    "$ref": "#/definitions/activity_log"
  bookmark:
    "$ref": "#/definitions/bookmark"
  bookmark_tag:
    "$ref": "#/definitions/bookmark_tag"
  category:
    "$ref": "#/definitions/category"
  channel:
    "$ref": "#/definitions/channel"
  curation:
    "$ref": "#/definitions/curation"
  external_account:
    "$ref": "#/definitions/external_account"
  ingredient:
    "$ref": "#/definitions/ingredient"
  notification:
    "$ref": "#/definitions/notification"
  oauth_application:
    "$ref": "#/definitions/oauth_application"
  photo_report:
```



11309 lines (10502 sloc) 398.685 kb

Cookpad Global API

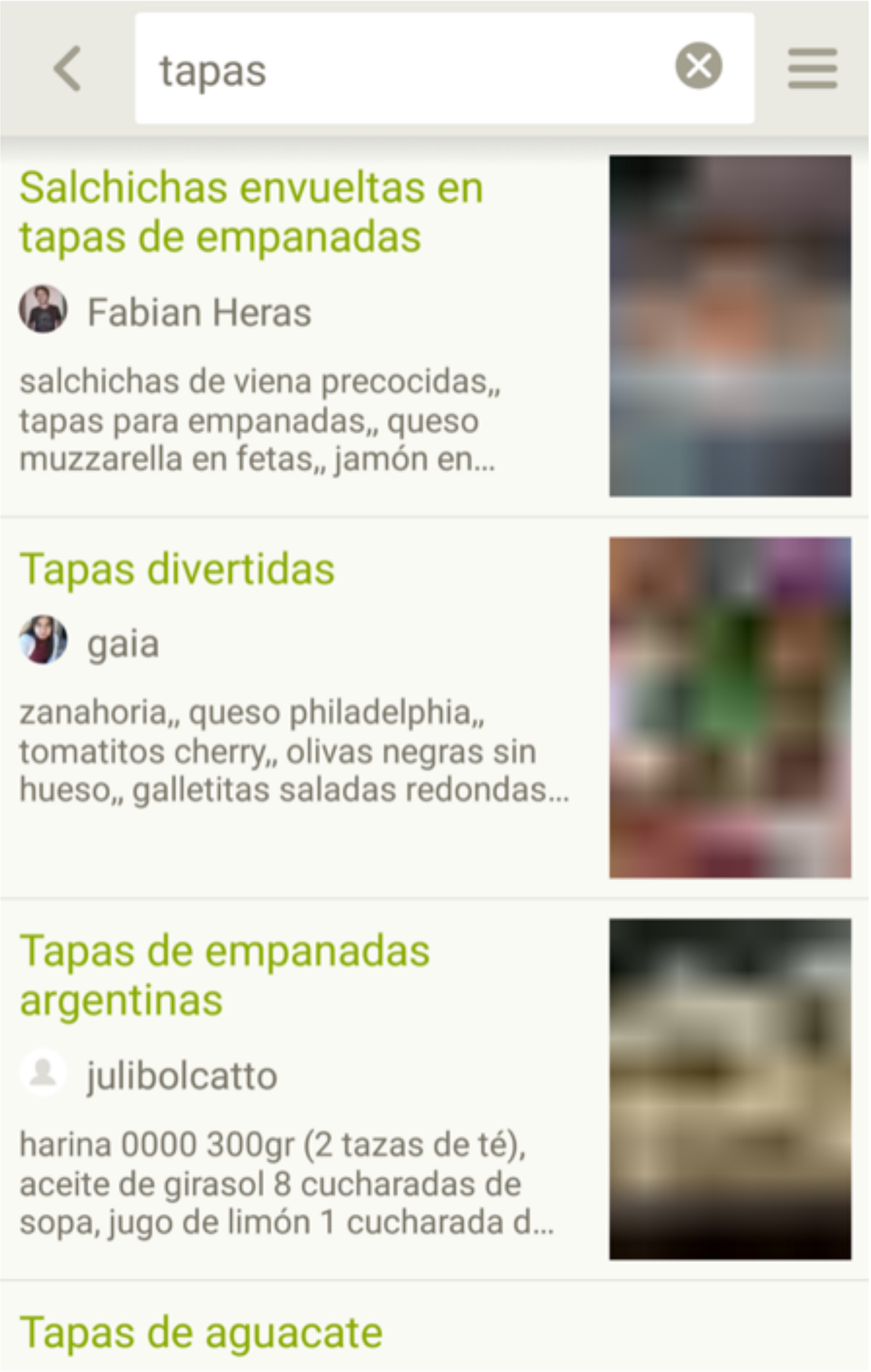
Cookpad Global API

- Account
  - POST /accounts
  - DELETE /accounts/:user_id
  - DELETE /accounts/:user_id/external
- Activity
  - GET /activities
  - GET /users/:id/activities
- ActivityLog
  - POST /activity_logs
- AdminChannelCurations
  - GET /admin/channels/:id/curations
  - POST /admin/channels/:id/curations
  - DELETE /admin/channels/:id/curations/:id
- AdminChannels
  - GET /admin/channels
  - GET /admin/channels/:id

🙌

We don’t need to update documentation manually. And we can see latest documentation any time.

Conclusion



tapas

Salchichas envueltas en tapas de empanadas

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salchichas de viena precocidas,, tapas para empanadas,, queso muzzarella en fetas,, jamón en...

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gaia

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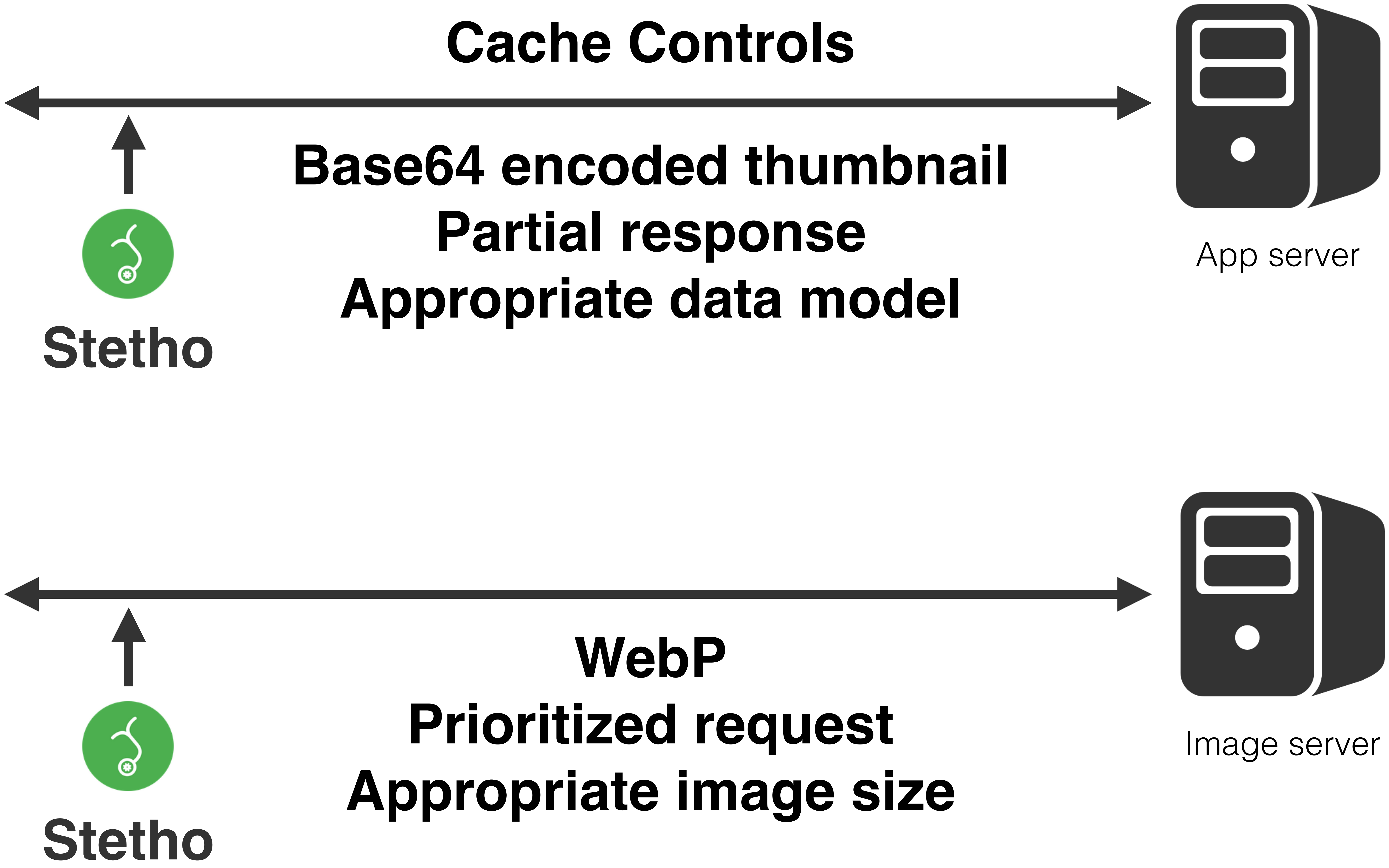
Tapas de empanadas argentinas

julibolcatto

harina 0000 300gr (2 tazas de té), aceite de girasol 8 cucharadas de sopa, jugo de limón 1 cucharada d...

Tapas de aguacate



Generate documentation
Auto validation

GZIP
Cache Controls

Base64 encoded thumbnail
Partial response
Appropriate data model

Stetho

App server

WebP
Prioritized request
Appropriate image size

Stetho

Image server

Thank you!

@rejasupotaro
Kentaro Takiguchi