Getting Erlang to talk to the outside world

In a language that they understand!

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Code BEAM Lite Amsterdam

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What is this about?

- Case study: how we are making Deribit talk to the outside world
- Some general thoughts and experiences about interfaces and APIs

- What is Deribit? (and which outside world?)

- Who are we?
  - Sebastian Smyczyński
  - Paweł Łazarski
  - Robert Łucarz
  - Piotr Skonieczka
  - Andrew Yanovsky
  - Willem de Jong

Getting Erlang to talk to the outside world

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ABSTRACT

How should Erlang talk to the outside world? - this question becomes interesting if we want to build distributed applications where Erlang is one of a number of communicating components.

We assume these components interact by exchanging messages - at this level of abstraction, details of programming language, operating system and host architecture are irrelevant. What is important is the ease with which we can construct such systems, and the precision with which we can isolate faulty components in such a system. Also of importance is the efficiency (both in terms of CPU and bandwidth requirem... ...nd receive... in the sy...

One w... ...roblem i... XML fa... ...chemas, ... WSDL) ... ...and over... and prop... ...pler bina... called UB... ...). The UB... has the expressive power of the XML set of standards - but is considerably simpler.

UBF has been prototyped in Erlang - the entire scheme ...(equivalent in semantic power to the XML series of stan...
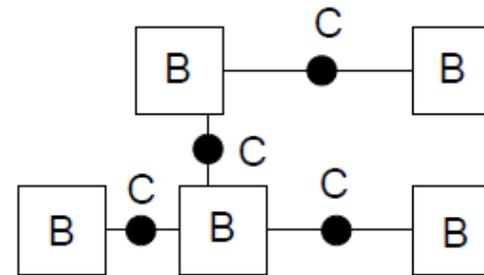

Figure 1: Black boxes and Contract Checkers

...ponents are written in different program... ...on differe... ...he networ... ...n in Erlan... ...ght run on ... ...ons"How s...

Suppose f... ...ent components and that the... ...lem - each indi- vidual comp... ...sumed to work,

XML/SOAP/WSDL: inefficient and overly complex

Transport layer
Type system
Protocol description

But the outside world does not understand UBF…

CORBA: difficult to implement

Some personal experiences

- ASN.1 at KPN/ETSI
  - Nice, but not open! No free spec, no free tools – A missed opportunity from a different age
- SOAP at T-Mobile
  - Actually not so bad, for our use case
- XML parser (erlsom)
  - Getting to know all the complexity of XML-Schema
- SOAP Erlang implementation
  - A bit of a mess, from the perspective of a tool writer
- JSON/Rest at T-Mobile and in a hobby project
  - What, no schema? (but nice for the hobby project)
- gRPC Erlang implementation
  - Nice, but support is still lacking

BTC-USD Perpetual (x100)

○ Contracts ($10) ○ BTC

Order Type:

Limit	Market	Stop-Market	Stop-Limit

Quantity:

Contracts	−	+

≈ ฿0.0000

Price: MIN SELL: 4119.11 MAX BUY: 4202.33

$ 4176.5	−	+

↑ BUY	SELL ↓

BUY MARGIN: SELL MARGIN:
฿0.00000000   ฿0.00000000

Time in force:

GTC	FOK	IOC

☐ Post Only   ☐ Hidden

Current Position: [0]   Max Leverage: [x100]

Perpetual (x100) | 28-12-2018 | 29-03-2019

24h High	24h Low	24h Vol.	Open	Funding/8h
4226.50	3626.00	฿13970.69	฿3041.52	-0.210%

Price	Size (x $10)	Total (x $10)
4164.50	3500	16190
4164.00	2567	12690
4163.50	3000	10123
4162.50	2000	7123
4162.00	2533	5123
4161.50	1234	2590
4161.00	450	1356
4160.50	906	906

⊙ 4160.50   Mark 4160.28   Index 4171.12

Price	Size (x $10)	Total (x $10)
4160.00	243	243
4159.50	6249	6492
4159.00	104	6596
4158.00	32	6628
4157.50	50	6678
4156.50	4789	11467
4156.00	1200	12667
4155.00	1000	13667

Recent Trades

Side	Price	Quantity	Date Time
Buy	4160.50	1426	11-28 15:12:07
Buy	4160.00	42	11-28 15:12:07
Buy	4160.00	450	11-28 15:12:07
Buy	4160.00	82	11-28 15:12:07
Buy	4160.00	2000	11-28 15:12:07
Buy	4160.00	1	11-28 15:11:58
Sell	4159.50	10	11-28 15:11:40
Sell	4161.50	1	11-28 15:11:17
Buy	4162.00	600	11-28 15:10:48
Buy	4162.00	600	11-28 15:10:48
Buy	4162.00	600	11-28 15:10:48
Buy	4158.00	1627	11-28 15:10:46
Buy	4158.00	2	11-28 15:10:46
Buy	4158.00	4	11-28 15:10:46
Buy	4158.00	2	11-28 15:10:45
Buy	4158.00	14	11-28 15:10:45
Buy	4158.00	43	11-28 15:10:45
Buy	4158.00	10	11-28 15:10:45
Buy	4158.00	4	11-28 15:10:45
Buy	4158.00	12	11-28 15:10:45
Buy	4158.00	11	11-28 15:10:45
Buy	4158.00	7	11-28 15:10:45
Buy	4158.00	7	11-28 15:10:45
Buy	4158.00	7	11-28 15:10:44

the Deribit server talks to the outside world
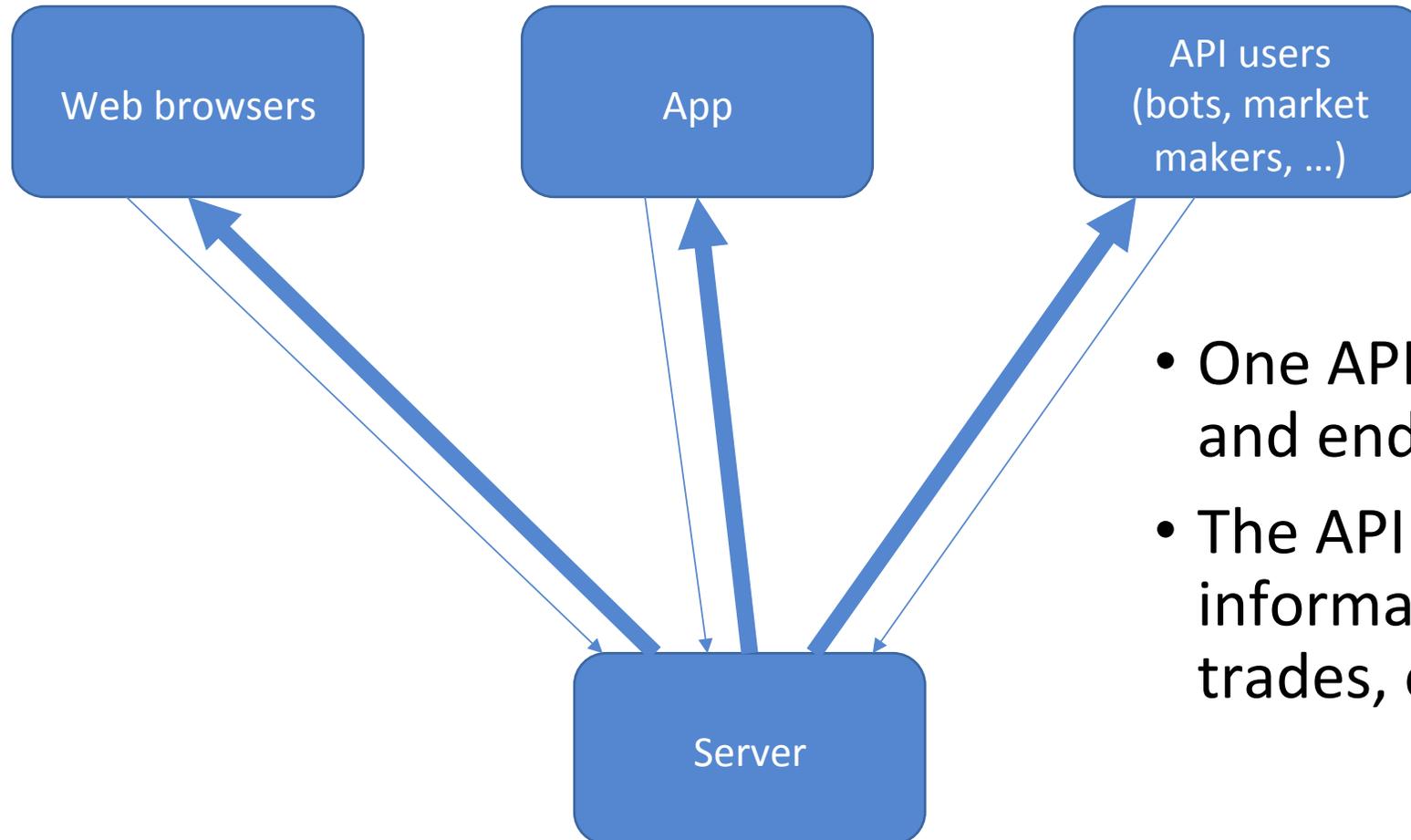
- One API used by the web site, App and end users (bots, big traders)
- The API pushes a lot of information to the users: index, trades, order book

Our requirements at Deribit

- 2-way: we push a lot of information from the server to the client
- Must be easy to use
  - Also for parties with limited technical capabilities: speak a language that they understand
  - Must be easy to use from web browser/JavaScript (one API!)
- Must be efficient and fast
  - Markets are volatile, traders need a fast API
  - cannot use too many resources on the server side
- Must have documentation
- Must have a tool to test and visualize

The solution: json-rpc, websockets, OpenApi

- JSON-RPC – "designed to be simple"
  - With some extensions to support notifications from server to client (subscriptions)
- Using websockets as bearer
  - Efficient 2-way communication
  - Easy to use from browser
  - Good support in Cowboy
- Using OpenAPI (FKA swagger) as the specification language
  - Not great, and not a 100% fit, but usable

- With additional support for REST/HTTP
  - To have a simple fallback option
  - Corresponding to the OpenApi spec – can be used with standard tools
  - No subscriptions

Deribit API Console

Token

Enter Your Token

Get token

Email address

Category

All categories ▼

Action

/private/change_subaccount_name ▼

Change the user name for a subaccount

Arguments

sid:

name:

Send Websocket Request

Send request via HTTP ▾

Time Log:

[Rest and WebSocket API Documentation]

API Request

API Results and notifications

Deribit API Console

Token

`6uJwUBTZaNTkN8Qvi9K3fxcgwqSe3d3Web17hTr`

[Get a token]

Category

All categories ▼

Action

/private/change_subaccount_name ▼

Change the user name for a subaccount

Arguments

sid:

name:

[Send Websocket Request]
[Send request via HTTP ▼]

Time Log:

```
call time 16:41:7 589ms
notify time 16:41:7 798ms
```

[Rest and WebSocket API Documentation]

[FIX API Documentation]

API Request

```
{
    "id": 6299,
    "method": "public/auth",
    "params": {
        "grant_type": "password",
        "username": "tgajewski@anteeo.com.pl",
        "password": "********"
    }
}
```

API Results and notifications

```
{
    "jsonrpc": "2.0",
    "id": 6299,
    "result": {
        "token_type": "bearer",
        "scope": "",
        "refresh_token": "75HC4846DysRbp9fm5D542fZZQ4yMCcmxXadNGaK8oFB",
        "expires_in": 315360000,
        "access_token": "6uJwUBTZaNTkN8Qvi9K3fxcgwqSe3d3Web17hTrs6hYA"
    },
    "usIn": 1543419667045948,
    "usOut": 1543419667226854,
    "usDiff": 180906,
    "testnet": false
}
```

OpenApi spec, tooling
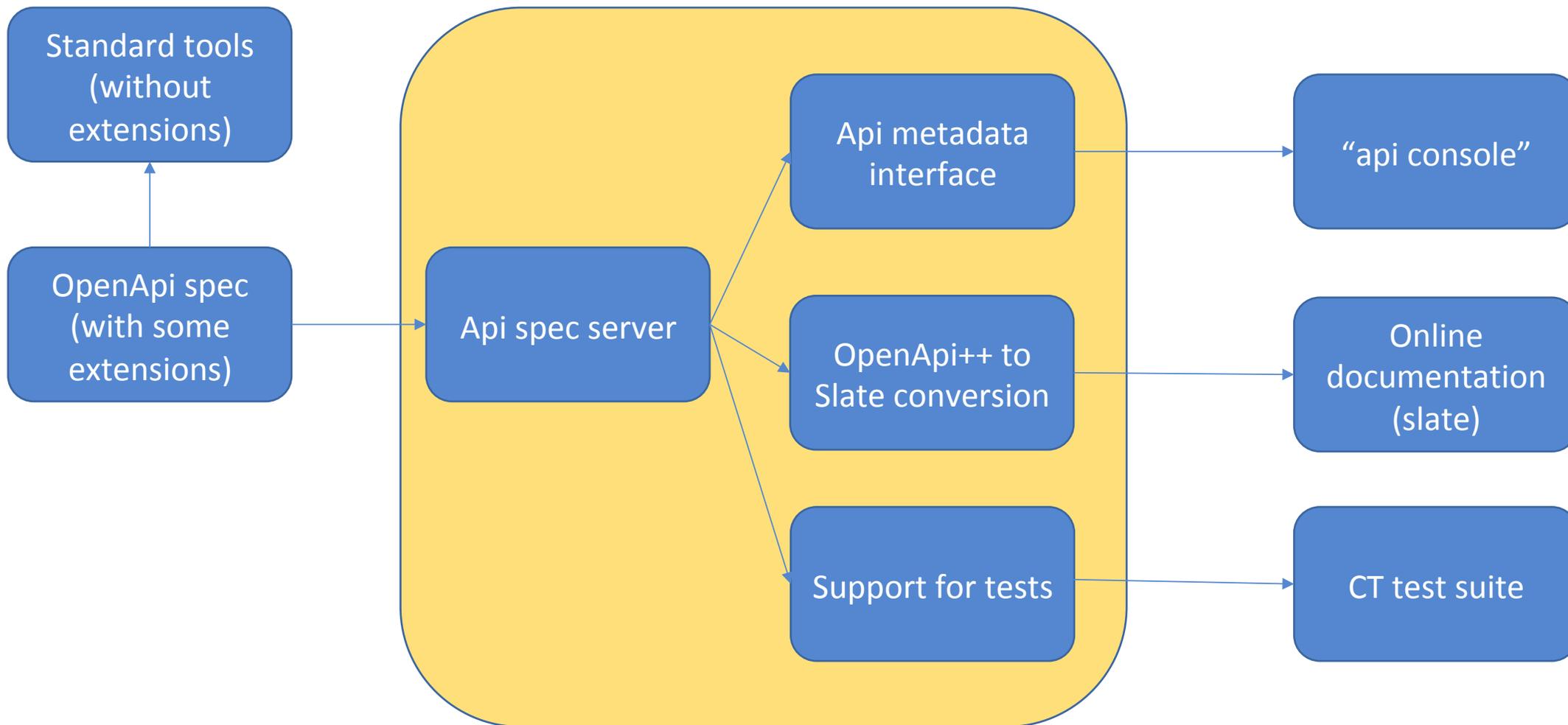
Authentication

shell   **javascript**   **python**

/public/auth

Retrieve an Oauth access token, to be used for authentication of 'private' requests.

Three methods of authentication are supported:

- `password` - using email and and password as when logging on to the website
- `client_credentials` - using the access key and access secret that can be found on the API page on the website
- `refresh_token` - using a refresh token that was received from an earlier invocation

The response will contain an access token, expiration period (number of seconds that the token is valid) and a refresh token that can be used to get a new set of tokens.

[Try in API console](#)

```shell
curl -X GET "https://test.deribit.com/api/v2/public/auth?grant_type=password&username=
-H "Content-Type: application/json"
```

The above command returns JSON structured like this:

```json
{
    "jsonrpc": "2.0",
    "result": {
        "expires_in": 315360000,
        "refresh_token": "6faf8L36JdaSqsjCEEiwqifPpj6JB18RWwiWHrsGTZ91",
        "scope": "string",
        "token_type": "bearer"
    }
}
```

Parameters

Parameter	Required	Type	Enum	Description
grant_type	true	string	password client_credentials refresh_token	Method of authentication
username	false	string		Required for grant type password
password	false	string		Required for grant type password
client_id	false	string		Required for grant type client_credentials
client_secret	false	string		Required for grant type client_credentials
refresh_token	false	string		Required for grant type refresh_token
state	false	string		Will be passed back in

Sidebar navigation

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DERIBIT API V2.0.0

Overview
JSON-RPC

METHODS

Authentication
   /public/auth
   /private/logout
Session management
Supporting
Subscription management
Account management
Trading
Market data

SUBSCRIPTIONS

FIX API

To the Deribit website
Documentation Powered by Slate

Talk to the outside world in a language that they understand

- Standards are important (you knew that, of course)
- It would be nice if there would be more support for gRPC
  - probably just a matter of time
- Tools & specs are important
  - To test, inspect, validate, author, …
- If necessary, combine some things and write some simple tools
  - To help yourself as well as the outside world